

Service Manual

Cassette Deck

dbx* Equipped Cassette Deck with
Electronic Multi-Mode Counter

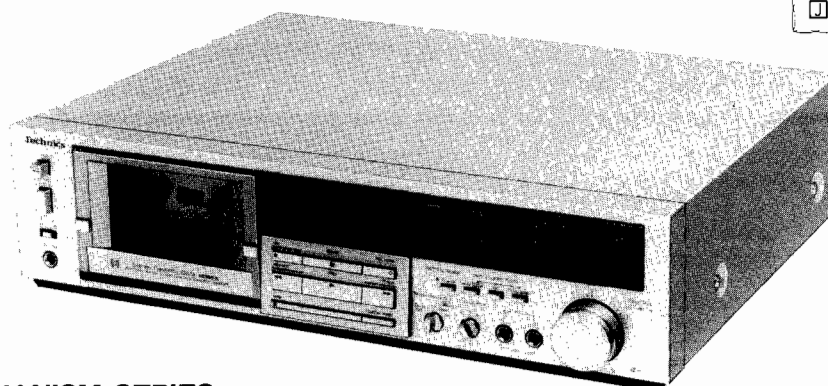
RS-M255X
(Silver Face)



This is the Service Manual for the following areas.

☐ For Asian PX.

☐ For European PX.



RS-M250 MECHANISM SERIES

NOTE:

For the products (RS-M255X) delivered to PX, please refer to the table below and the attached Service Manual, since their parts are the same as those of the silver type products delivered to Asia, Latin America, the Middle East and Africa (regions marked ☐ in the Service Manual) except for the parts listed in the table.

PARTS COMPARISON TABLE:

Please revise the original parts list in the Service Manual RS-M255X (of the silver type model for ☐ mark areas) to conform to the changes shown herein.

If new part numbers are shown, be sure to use them when ordering parts.

Ref. No.	Part Name & Description	Part Numbers		Remarks
		☐ ... For Asia, Latin America, Middle East and Africa areas. "Silver Type"	☐ ... For Asian PX. ☐ ... For European PX. "Silver Type"	
G35	Main Name Plate	QGS2985	QGS3036	
A2	Instruction Book	QQT3266	QQT3357	
P1	Inside Carton	QPN4290	QPN4306	

* The term dbx is a registered trademark of dbx Inc.

** 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.

Technics

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P.O. Box 288, Central Osaka Japan

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Cassette Deck

RS-M255X

(Silver Face)
(Black Face)



[N] For Asia, Latin America, Middle East and Africa areas.

[A] For Australia.

- ## RS-M250 MECHANISM SERIES

Specifications

Track system:	4-track 2-channel stereo recording and playback	Fast forward and
Tape speed:	4.8cm/s (1-7/8ips)	rewind time: Approx. 90 seconds with C-60 cassette tape
Wow and flutter:	0.038 % (WRMS)	Inputs:
Frequency response:	Metal tape; 20 – 20,000Hz 30 – 17,000Hz ± 3 dB	MIC; sensitivity 0.25 mV, applicable microphone impedance 400Ω – 10 kΩ
	CrO ₂ tape; 20 – 19,000Hz 30 – 16,000Hz ± 3 dB	LINE; sensitivity 60 mV, input impedance 47 kΩ
	Normal tape; 20 – 18,000Hz 30 – 15,000Hz ± 3 dB	Outputs:
Dynamic range:	110 dB (at 1 kHz) with dbx in	LINE; output level 700 mV, load impedance 22 kΩ over
Max. input level		HEADPHONES; output level 125 mV (at 8 Ω)
improvement:	10 dB or more improved with dbx in (at 1 kHz)	Bias frequency:
Signal-to-noise ratio:	dbx* in; 92 dB	85 kHz
	Dolby* NR in; 68 dB (above 5 kHz)	Motor:
	Dolby NR out; 58 dB (signal level = max. input level A weighted, CrO ₂ type tape)	2-motor system
		Heads:
		2-head system
		1-SX (Sendust Extra) head for record/playback
		1-double-gap ferrite head for erasure
		Power requirement:
		AC; 110/125/220/240 V, 50-60 Hz
		preset power voltage 240 V
		Power consumption:
		☐ 18W
		☐ 28W
		Dimensions:
		43.0cm(W) × 10.8cm(H) × 33.1cm(D)
		Weight:
		6.0kg

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P.O. Box 288, Central Osaka Japan

Important safety notice
Components identified by mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.	Ref. No.	Part No.
RESISTORS											
R 1, 2	ERD25TJ273	R 132	ERD25TJ183	R 289, 290	ERD25FJ103	R 419 [A]	ERD25FJ121	C 25, 26	ECKD1H392KB	C 217, 218	ECQM1H103JZ
R 3, 4	ERD25TJ474	R 133, 134, 135	ERD25TJ183	R 291, 292	ERD25TJ155	[For Australia.]		C 27, 28	ECEA1AS470	C 219, 220	ECOD1H101KC
R 5, 6	ERD25FJ471	R 136	ERD25TJ274	R 301, 302, 303, 304	ERD25FJ155	R 420 [N]	ERD25FJ821	C 29, 30	ECEA50M1R	C 221, 222, 223, 224	
R 7, 8	ERD25FJ332	R 137	ERD25TJ123	R 305	ERD50FJ221	[For Asia, Latin America, Middle East and Africa areas.]		C 31, 32	ECKD1H103ZF	C 225, 226, 227, 228	ECEA254R7
R 9, 10	ERD25FJ680	R 138	ERD25FJ562	R 306, 307	ERD25TJ473	[A]	ERD50FJ331	C 33, 34	ECEA16M10R	C 229, 230, 231, 232	ECQV05104JZ
R 11, 12	ERD25FJ103	R 139	ERD25FJ100	R 309	ERD25TJ223	[For Australia.]		C 35, 36	ECEA1AS221		
R 13, 14	ERD25TJ334	R 140	ERD25FJ562	R 310	ERD25TJ104	R 421	ERD25TJ104	C 37, 38	ECQV05334JZ		
R 15, 16	ERD25FJ472	R 141	ERD25FJ1R0	R 311	ERD25TJ473	R 422	ERD25TJ223	C 39, 40	ECQM1H392JZ		
R 17, 18	ERD25FJ562	R 142	ERD25FJ822	R 312	ERD25FJ183	R 423	ERD25TJ123	C 41, 42	ECQM1H472JZ		
R 19, 20	ERD25TJ225	R 143	ERD25TJ154	R 314	ERD25FJ182	R 424	ERD25FJ560	C 43, 44	ECEA1HS100	C 233, 234	ECOD1H331K
R 21, 22	ERD25FJ332	R 144	ERD25TJ124	R 315	ERD25FJ102			C 45, 46	ECQM1H273JZ	C 235, 236	ECQV05104JZ
R 23, 24	ERD25TJ225	R 145	ERD25TJ473	R 316	ERD25FJ103			C 47, 48	ECEA50M3R3R	C 237, 238	ECQM1H103JZ
R 25, 26	ERD25FJ101	R 146	ERD25FJ332	R 317	ERD25FJ472	[N]	ERD50FJ181	C 49, 50	ECQM1H104JZ	C 239, 240	ECQM1H102JZ
R 29, 30	ERD25FJ103	R 147	ERD25FJ103	R 318	ERD25FJ472	[For Asia, Latin America, Middle East and Africa areas.]		C 51, 52	ECEA1HS100	C 241, 242	ECEA16M10R
R 31, 32	ERD25FJ681	R 148	ERD25FJ332	R 319	ERD25TJ154	[A]	ERD50FJ271	C 53, 54	ECFDD473KXY	C 243, 244	ECEA1HS100
R 33, 34	ERD25FJ100	R 149	ERD25FJ222	R 320	ERD25TJ154	[For Australia.]		C 55, 56	ECEA1AS471	C 245	ECQM1H102JZ
R 35, 36	ERD25FJ182	R 150	ERD25FJ822	R 321, 322	ERD25TJ683	R 428 [A]	ERD25FJ392	C 57, 58	ECQM1H562JZ	C 247, 248	ECEA1ES470
R 37, 38	ERD25FJ472	R 151	ERD25TJ154	R 323, 324	ERD25TJ563	[For Australia.]		C 59, 60	ECQV05224JZ	C 249, 250	ECOD1H151KC
R 39	ERD25FJ561	R 152	ERD25TJ563	R 325, 326	ERD25TJ224	R 429 [A]	ERD25FJ562	C 61, 62, 63, 64	ECEA1HS100	C 301	ECFDD104KXY
R 40	ERD25FJ822	R 153	ERD25FJ471	R 327, 328	ERD25FJ222	R 429 [A]	ERD25FJ562	C 65, 66	ECEA25N3R3	C 302, 303	ECFDD223KXY
R 41, 42	ERD25TJ123	R 154	ERD25FJ122	R 329	ERD25FJ100	[For Australia.]		C 67, 68	ECQV05154JZ	C 305, 306	ECEA50Z2R47
R 43, 44	ERD25FJ151	R 155, 156	ERD25FJ102	R 330	ERD25FJ562	R 430[A]	ERD25TJ683	C 69, 70	ECEA5021	C 307, 308	ECEA1HS100
R 45, 46	ERD25FJ102	R 157, 158	ERD25TJ183	R 331	ERD25FJ562	[For Australia.]		C 71, 72	ECEA5022R2	C 309	ECEA1ES101
R 47, 48	ERD25TJ274	R 159, 160	ERD25FJ102	R 332	ERD25TJ473	R 501, 502, 503, 504, 505		C 73, 74	ECQM1H273JZ	C 310	ECFDD473KXY
R 49, 50, 51, 52		R 161	ERD25TJ223	R 333	ERD25TJ104	R 506	ERD25TJ473	C 75, 76	ECQM1H682JZ	C 311	E
	ERD25TJ105	R 162	ERD25FJ101	R 334	ERD25TJ224	R 507	ERD25FJ331	C 77, 78	ECQM1H153JZ	C 401	ECEA1ES332
R 53, 54	ERD25TJ473	R 163, 164	ERD25TJ123	R 335	ERD25TJ473	R 508	ERD25FJ271	C 79, 80	ECQM1H333JZ	C 402	ECEA1ES101
R 55, 56	ERD25FJ332	R 165, 166	ERD25FJ562	R 336	ERD25FJ332	R 509	ERD25FJ331	C 81, 82	ECQM1H683JZ	C 403	ECKD1H103ZF
R 57, 58	ERD25TJ274	R 167	ERD25FJ100	R 337, 338	ERD25TJ684	R 510	ERD25FJ271	C 83	ECEA1CS5221		
R 59, 60	ERD25TJ184	R 168, 169	ERD25FJ102	R 339, 340	ERD25FJ562	R 511	ERD25FJ271	C 84	ECEA1CS471	C 404	ECEA1ES220
R 61, 62	ERD25FJ332	R 170	ERD25FJ821	R 401	ERD25FJ102	R 512	ERD25FJ271	C 85, 86	ECQV0568JZ	C 405	ECEA1CS331
		R 171	ERQ12HJ100	R 402		R 513	ERD25TJ104	C 87, 88	ECEA1ES220	C 406	ECKD1H103ZF
		R 201, 203	ERD25TJ104	[N] Δ	ERQ12HJ2R7	R 514	ERD25TJ223	C 89, 90	ECKD1H102KB	C 407	ECEA1ES222
R 63, 64	ERD25FJ181	R 205, 206	ERD25FJ101	[For Asia, Latin America, Middle East and Africa areas.]		R 515	ERD25FJ562	C 91, 92	ECQM1H392JZ	C 408	ECEA1ES101
R 65, 66	ERD25FJ101	R 207, 208	ERD25TJ474	[A] Δ	ERX12ANJ2R7	R 516	ERX12ANJ1R5	C 93, 94	ECKD2H121KB	C 409	ECKD1H103ZF
R 67, 68	ERD25TJ223	R 209, 210	ERD25TJ105	[For Australia.]		R 517	ERD25FJ222	C 95, 96	ECOD1H101KC	C 410	ECEA50Z21
R 69, 70	ERD25TJ154	R 211, 212	ERD25TJ124	R 403	ERD25FJ102	R 523	ERD25FJ222	C 97	ECEA1AS101	C 411	ECEA1CS331
R 71, 72	ERD25FJ102	R 213, 214	ERD25TJ473	R 404 [N]	ERD25FJ821	R 524	ERD25FJ102	C 98	ECEA1HS100	C 412	ECKD1H103ZF
R 73, 74	ERD25FJ392	R 215, 216	ERD25FJ472	[For Asia, Latin America, Middle East and Africa areas.]		R 525	ERD25FJ272	C 99	ECEA50Z2R47	C 413 [A]	ECOP1103JZ
R 75, 76	ERD25FJ681			[A]	ERD25FJ471					[For Australia.]	
R 77, 78	ERD25FJ820	R 217, 218	ERD25TJ473			R 526	ERD25FJ562	C 100	ECEA1HS100	C 414	ECEA1CS471
R 79, 80	ERD25FJ392	R 219, 220	ERD25TJ333			R 527	ERD25FJ471	C 101, 102	ECEA1CS330	C 415, 416	ECEA1CS472
R 81, 82, 83, 84		R 221, 222	ERD25FJ103	[A]	ERD25FJ471	R 701	ERD25FJ222	C 103, 104	ECFDD223KXY	C 417, 418	
	ERD25FJ152	R 223, 224	ERD25TJ473	[For Australia]		R 702	ERD25FJ221	C 105, 106	ECEA1HS100		ECEA1HS100
R 85, 86	ERD25FJ270	R 225, 226	ERD25FJ470			R 703	ERD25FJ331	C 107	ECEA1HF100	C 419	ECKD1H103ZF
R 87, 88	ERD25FJ562	R 227, 228	ERD25TJ124	R 405 [A]	ERD25FJ391	R 704	ERD25FJ102	C 108	ECQM1H822KZ	C 420 [A]	ECOP1103JZ
R 89, 90	ERD25FJ682	R 229, 230	ERD25FJ332	[For Australia.]		R 705, 706	ERD25FJ821	C 109	ECKD1H103ZF	[For Australia.]	
R 91, 92	ERD25FJ821	R 231, 232	ERD25TJ473	R 406	ERD25FJ332			C 110	ECFDD153KXY	C 421	ECEA1ES470
R 93, 94	ERD25TJ473	R 233, 234, 235, 236		R 407	ERD25FJ472			C 111	ECQV1153JZ	C 422	ECEA1ES220
R 95, 96	ERD25FJ820	R 237, 238	ERD25FJ103	R 408	ERD25FJ103			C 112	ECEA1HSR33	C 423	ECEA1ES470
R 97, 98	ERD25FJ560			R 409 Δ	ERD25FJ102					C 424	ECEA1ES220
R 101	ERD25FJ222	R 239, 240	ERD25TJ333	R 410						C 425, 426	ECFDD104KZY
R 102	ERD25TJ224	R 241	ERD25FJ102	[N] Δ	ERQ12HJ2R7			C 113	ECEA50Z21		
R 103	ERD25TJ473	R 242	ERD25FJ102	[For Asia, Latin America, Middle East and Africa areas.]		VR 3, 4	QWKGTA024A54	C 114	ECEA1HS100	C 427	ECEA50Z3R3
		R 243, 244	ERD25TJ473	[A] Δ	ERX12ANJ2R7	VR 7, 8, 9, 10	EVNM4AA00B24	C 115	ECEA25Z4R7	C 428, 430	ECFDD104KZY
R 104	ERD25TJ563	R 245, 246	ERD25FJ101	[For Australia.]			EVNM4AA00B15	C 116	ECEA1CS330	C 431	ECEA1CS472
R 105	ERD25FJ472	R 247, 248	ERD25TJ473			VR 201, 202, 203, 204	EVNM00AA00B54	C 117	ECQM1H104JZ	C 435	ECKD1H103ZF
R 106	ERD25TJ473	R 249, 250	ERD25FJ103	R 411 Δ	ERD25FJ102			C 118, 119	ECKD1H103ZF	C 502	ECOD1H102MD
R 107	ERD25TJ273	R 251, 252	ERD25FJ102	R 412	ERD25FJ103	VR 205, 206, 207, 208	EVNM00AA00B14	C 120	ECKD1H223ZF	C 503	ECOD1H331K
R 108	ERD25FJ472	R 253, 254	ERD25FJ392	R 413	ERD25TJ823	VR 301	EVNM4AA00B24	C 121, 122	ECEA1HS100	C 504	ECEA1AS221
R 109, 110	ERD25TJ473	R 255, 256	ERD25TJ333	R 414 Δ	ERX2ANJ5R6	VR 302	EVNM4AA00B53	C 123, 124	ECEA1HS100	C 505	ECKD1H332ZF
R 111	ERD25TJ104					VR 501	EVNK4AA00B14	C 125, 126	ECOD1H221K	C 506	ECEA50Z2R2
R 112, 113, 114, 115		R 257, 258	ERD25TJ104	R 415				C 127, 128	ECKD1H103ZF	C 507	ECKD1H222MD
R 116	ERD25TJ473	R 259, 260	ERD25FJ472	[N] Δ	ERD25FJ182			C 129, 130	ECKD1H472MD		
R 117	ERD25FJ562	R 261, 262	ERD25TJ333	[For Asia, Latin America, Middle East and Africa areas.]				C 131	ECKD1H103ZF	C 508	ECEA1CN100
	ERD25TJ223	R 263, 264	ERD25FJ682	[A] Δ	ERD25FJ102			C 132, 133	ECKD1H223ZF	C 511	ECEA50Z2R1
R 118	ERD25TJ224	R 265, 266	ERD25FJ472	[For Australia.]		C 1, 2	ECEA1HS100	C 134, 136	ECQM1H152JZ	C 702	ECOD1H390JC
R 119	ERD25FJ152	R 267, 268	ERD25FJ220			C 3, 4	ECFDD103KXY	C 137, 138	ECKD1H102KB	C 703	ECOD1H101JC
R 120	ERD25TJ273	R 269, 270	ERD25TJ393	[A] Δ	ERD25FJ102	C 5, 6	ECEA5021	C 141, 142, 147		C 704	ECOD1H470JC
R 121, 122, 123		R 271, 272	ERD25TJ473	[For Australia]		C 7, 8	ECEA50Z2R47		ECKD1H223ZF		
	ERD25TJ473	R 273, 274	ERD25FJ332	R 416	ERD25FJ103	C 9, 10	ECKD1H681KB		ECKD1H392KB	C 201, 202	ECEA25Z4R7
R 124	ERD25TJ104	R 275, 276	ERD25TJ333	R 417		C 11, 12	ECEA1AS221		ECEA50Z1	C 203, 204	ECEA50Z1
R 125	ERD25FJ101			[A] Δ	ERD25FJ821	C 13, 14	ECQM1H123JZ				
R 126	ERD25FJ821	R 277, 278	ERD25TJ394	[For Australia.]							
R 127, 128	ERD25FJ391	R 279, 280	ERD25FJ102	R 418 [N]	ERD25FJ821						
R 129	ERD50FJ560	R 281, 282	ERD25FJ8R2	[For Asia, Latin America, Middle East and Africa areas.]							
R 130	ERD25FJ103	R 283, 284	ERD25TJ333								
R 131	ERD25TJ104	R 285	ERD25FJ103	[A]	ERD50FJ331						
		R 287	ERD25FJ392	[For Australia.]							

Ref No.	Part No.	Part Name & Description
ELECTRICAL PARTS		
E 1	QWY4123Z	Record/Playback Head
E 2	QWY2138Z	Erase Head
E 3	[N] Δ RJA52YAK	AC Power Cord
	[For Asia, Latin America, Middle East and Africa areas.]	
	[A] Δ SJA23	AC Power Cord
	[For Australia.]	
E 4	[N] QTD1129	Cord Bushing
	[For Asia, Latin America, Middle East and Africa areas.]	
	[A] QTD1164	Cord Bushing
	[For Australia.]	
E 5	QWA4402	dbx P.B. Holder
E 6	XTN3 + 16B	Tapping Screw $\oplus 3 \times 16$
E 7	XTN3 + 10B	Tapping Screw $\oplus 3 \times 10$
E 8	XTN3 + 8B	Tapping Screw $\oplus 3 \times 8$
E 9	XTS3 + 12B	Tapping Screw $\oplus 3 \times 12$
E 10	XTB3 + 10BFN	Tapping Screw $\oplus 3 \times 10$
E 11	QTD1181	Wire Clamp
E 12	QJ51003S	Jack Board
E 13	QJP1921TN	3 Pin Post
E 14	QJP1922TN	6 Pin Post
E 15	QJP1923TN	9 Pin Post
E 16	QJP1924TN	12 Pin Post
E 17	QJS1924TNL	12 Pin Socket
E 18		
	[N] Δ QCR0008	Spark Killer
	[For Asia, Latin America, Middle East and Africa areas.]	
	[A] Δ QCR0011	Spark Killer
	[For Australia.]	
E 19	SJ1777	Pin Terminal
E 20	XTN3 + 8B	Tapping Screw $\oplus 3 \times 8$
E 21	QWA4364	Switch Angle
E 22	XSN3 + 8S	Screw $\oplus 3 \times 8$
E 23	XWA3B	Washer
E 24		
	[N] Δ QIF1007	Fuse Holder
	[For Asia, Latin America, Middle East and Africa areas.]	
	[A] Δ QIF1054	Fuse Holder
	[For Australia.]	
E 25	QJ512001T	12 Pin Socket
E 26	XTN3 + 10B	Tapping Screw $\oplus 3 \times 10$

ELECTRICAL PARTS LOCATION

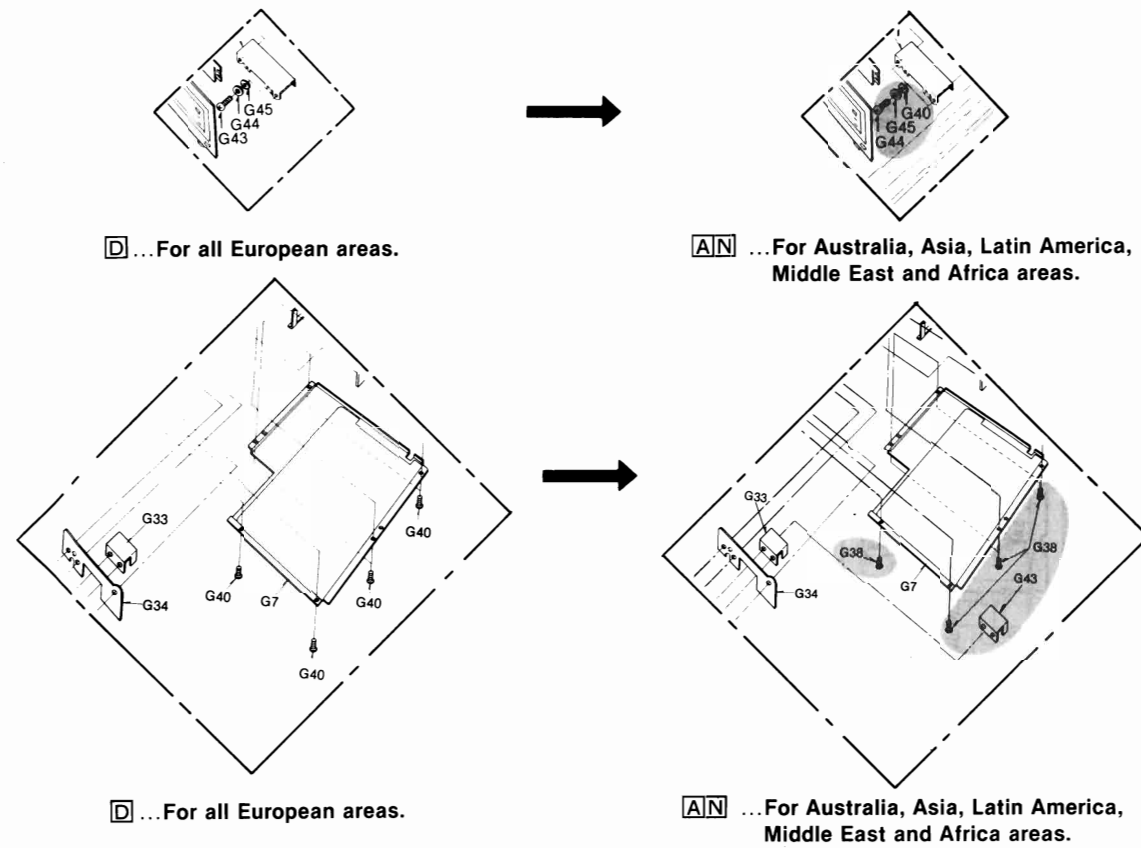
[A] For Australia.
F3
FUSE T1.25A
E24

[A] For Australia.
F1, 2
FUSE T630mA
E24

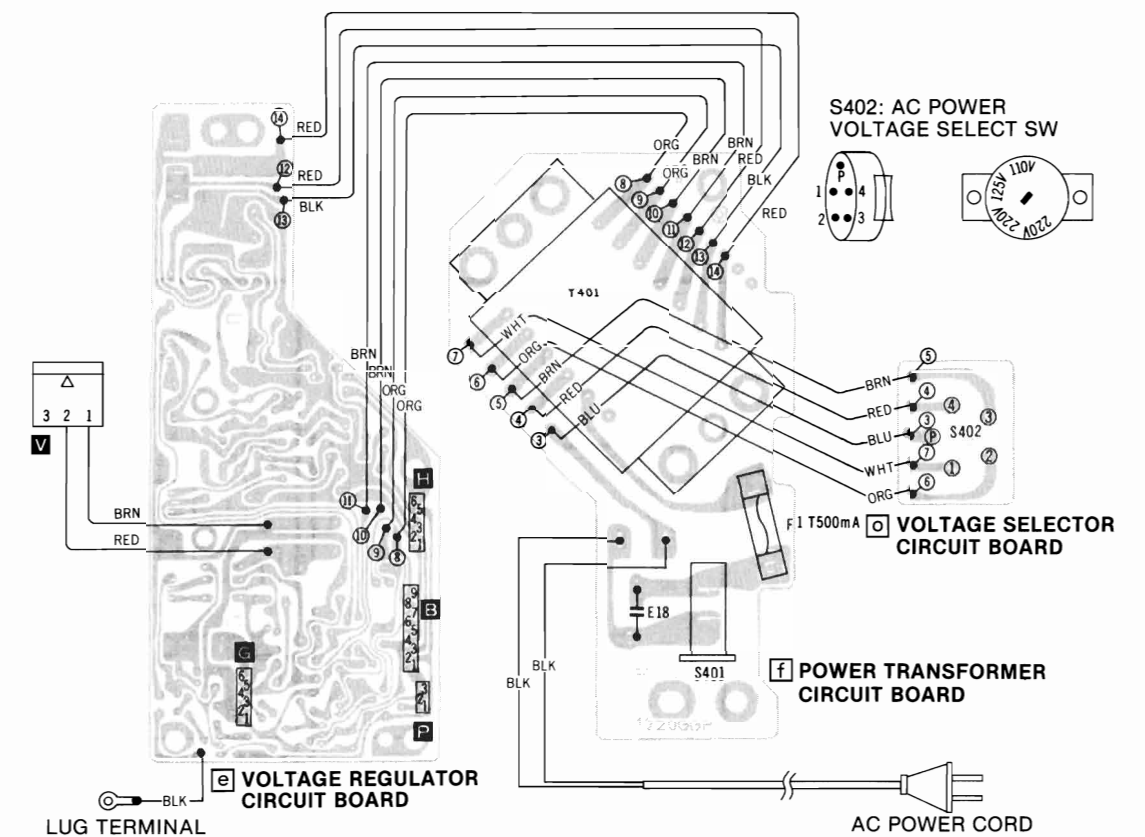
[A] For Australia.
F4, 5
FUSE T315mA
E24

**[N] For Asia, Latin America,
Middle East and Africa areas.**
F1
FUSE T500mA
E24

CABINET PARTS LOCATION

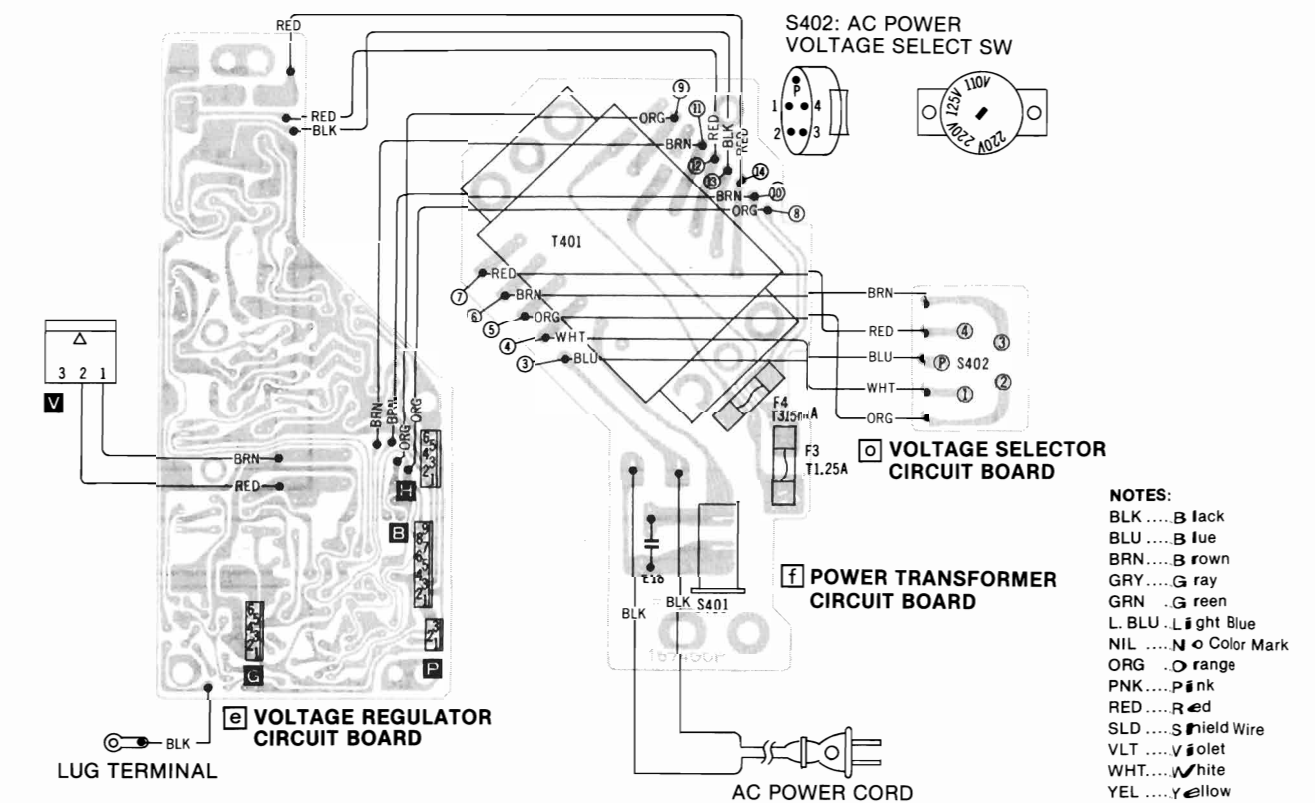
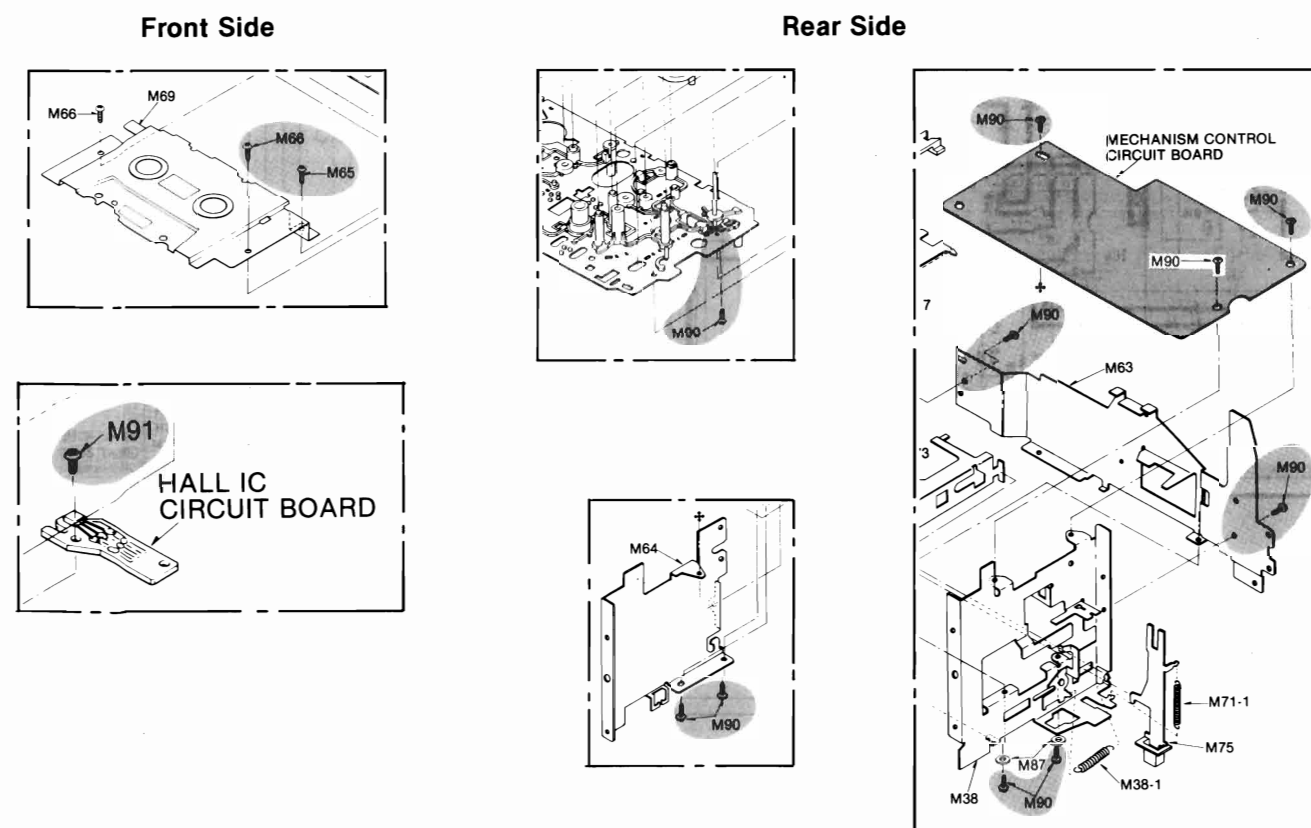


WIRING CONNECTION DIAGRAM



* For Asia, Latin America, Middle East and Africa areas.

MECHANISM PARTS LOCATION (DIFFERENCE)



* For Australia.

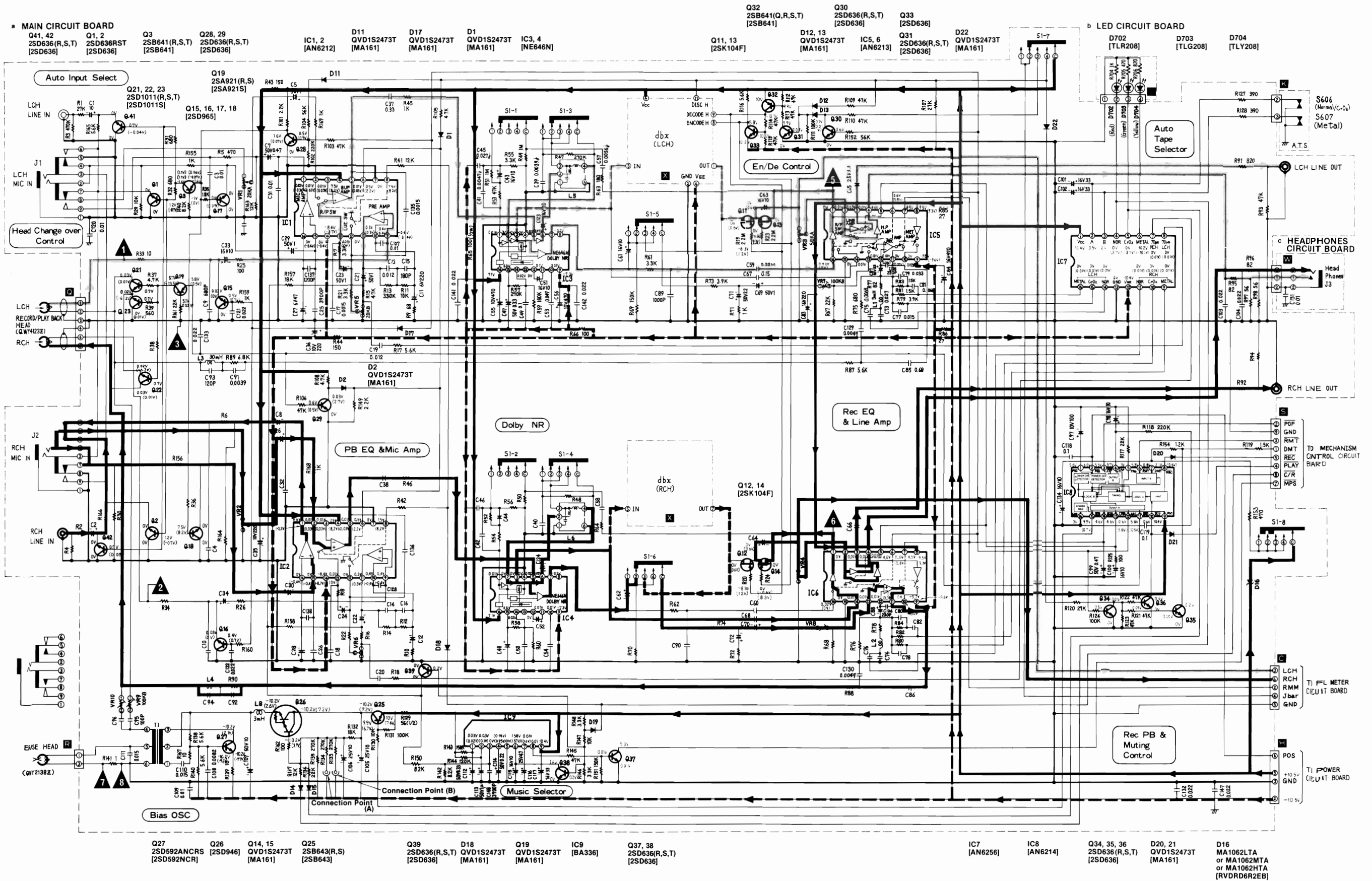
SCHEMATIC DIAGRAM

MAIN SECTION

NOTES:

- (—) indicates B + (bias).
- (—) indicates B - (bias).
- (—) indicates the flow of the playback signal (dbx out).
- (—) indicates the flow of the playback signal (dbx tape).
- (—) indicates the flow of the recording signal (dbx out).
- (—) indicates the flow of the recording signal (dbx tape).

- Voltage values shown in MAIN SECTION.
- NO MARK Voltage values at out (NR select switch) mode
- () Voltage values at record mode.
- [] Voltage values at disc (NR select switch) mode

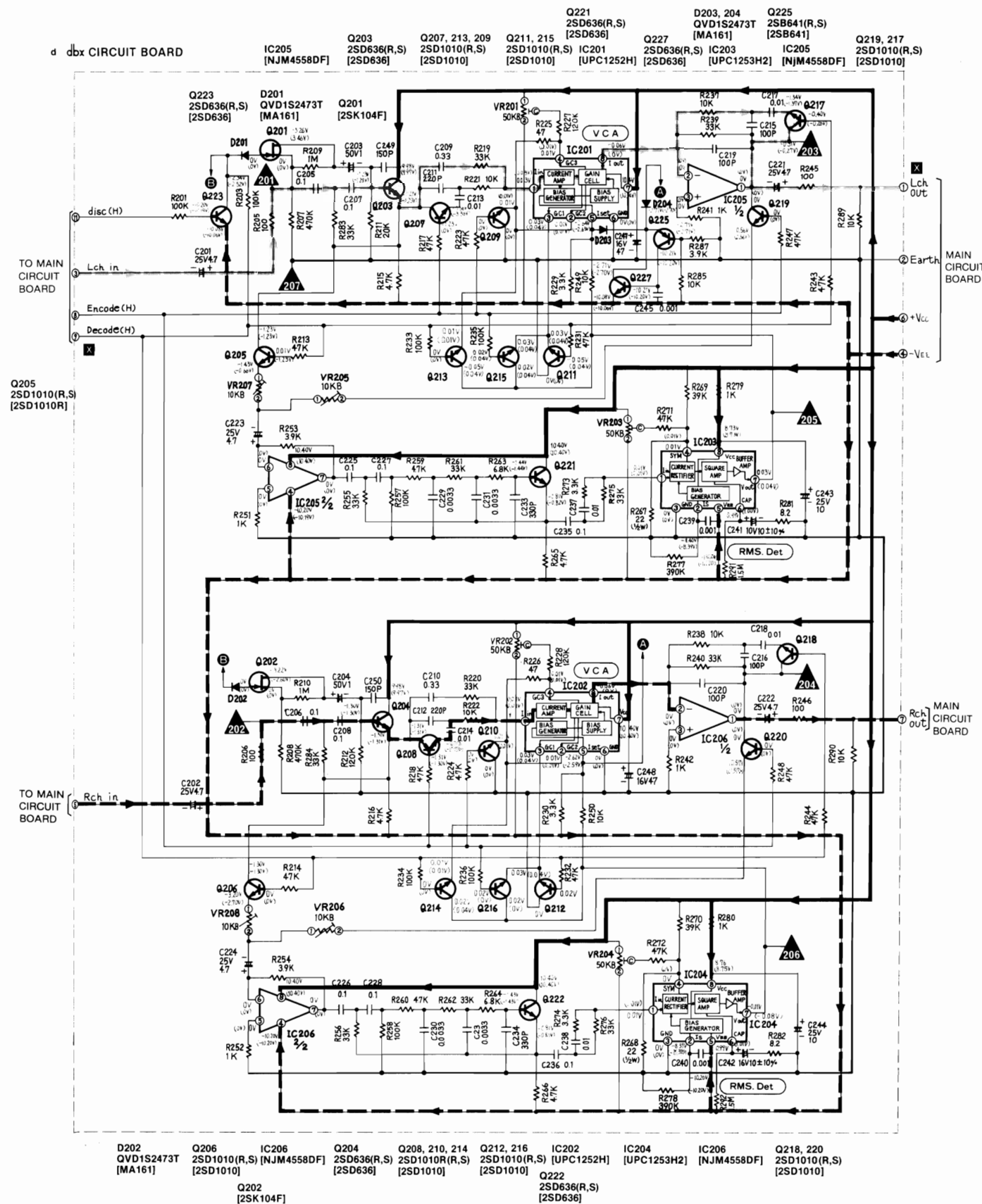


dbx SECTION

NOTES:

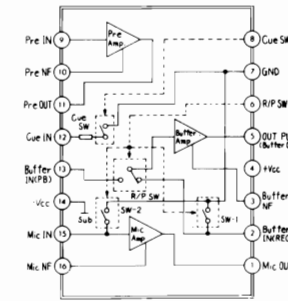
- Voltage values shown in dbx SECTION.
 - () Voltage values at out (NR select switch) mode.
 - [] Voltage values at disc (NR select switch) mode.
- For measurement use VTVM.

dbx CIRCUIT BOARD

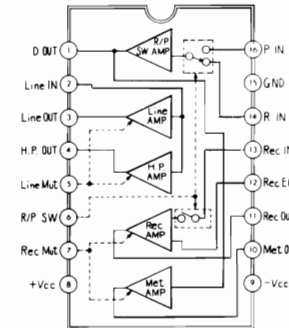


EQUIVALENT CIRCUITS

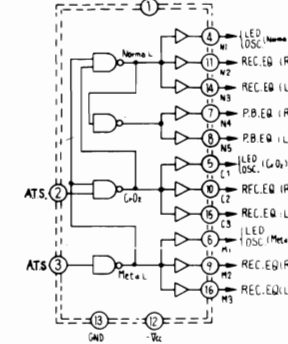
IC1,2 AN6212



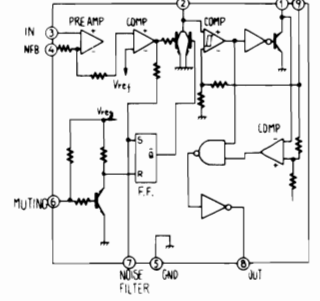
IC5,6 AN6213



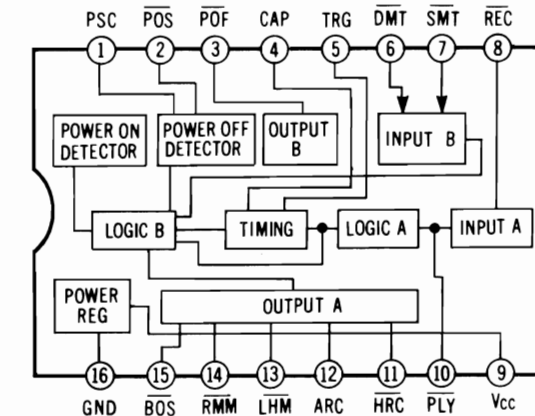
IC7 AN6256



IC9 BA336



IC8 AN6214



■ Truth table of IC1, 2 (Postive)

R / P SW	Operation
⑥ pin	REC
H	REC
L	PB

SW-1, SW-2

⑥ pin	Operation
H	Mute
L	Mute

Cue SW

⑧ pin	Operation
H	Cue
L	Cue

■ Truth table of IC5, 6 (Positive)

R / P SW	Operation
⑥ pin	REC
H	REC
L	PB

Muting

⑤, ⑦ Pin	Operation
H	Muting OFF
L	Muting ON

L : GND Level

SPECIFICATIONS

Playback S/N ratio • Test tape ... QZZCFM	Greater than 45 dB
Overall distortion • Test tape ... QZZCRA for Normal ... QZZCRX for CrO ₂ ... QZZCRZ for Metal	Less than 4 %
Overall S/N ratio • Test tape ... QZZCRA	Greater than 43 dB (without NAB filter)

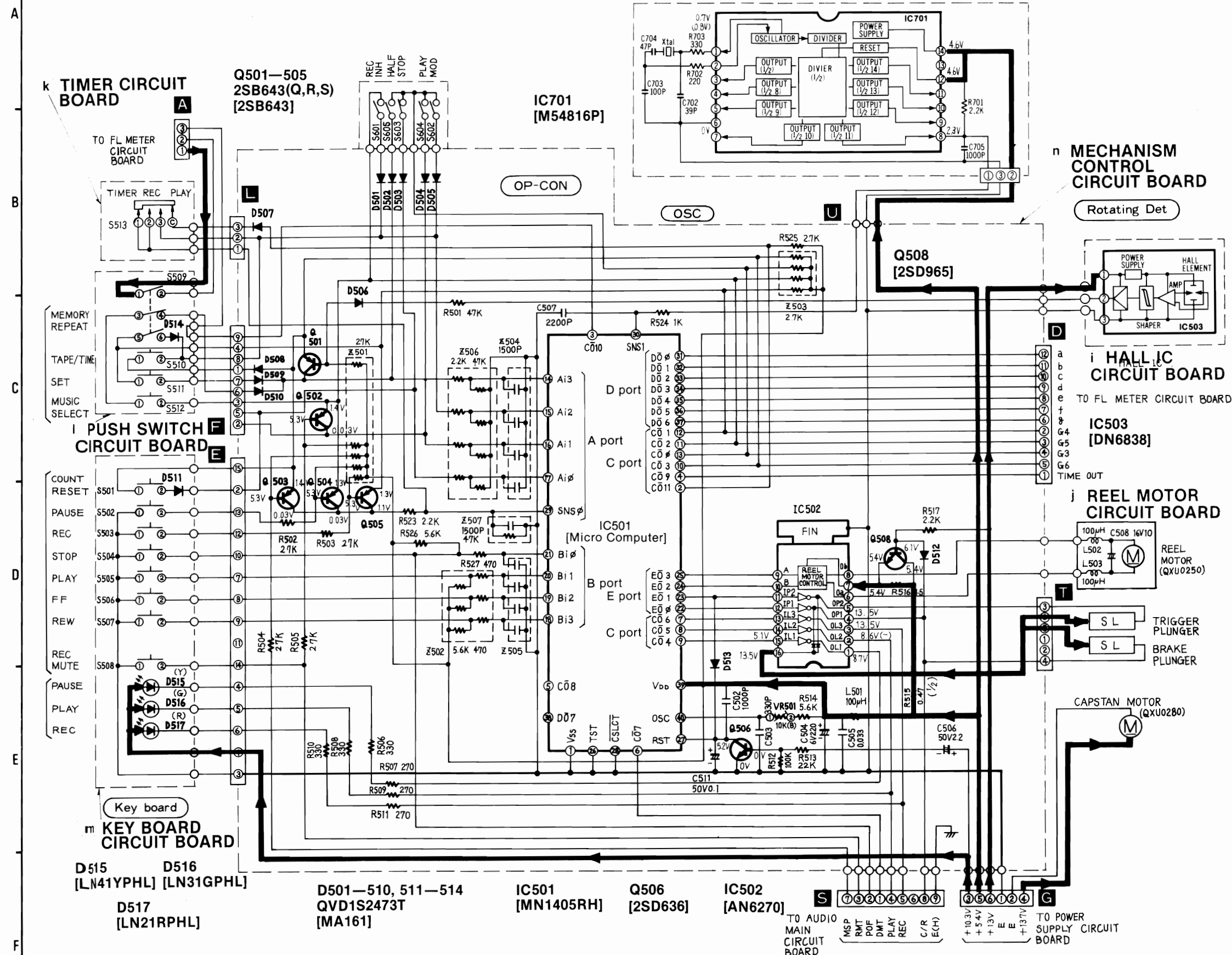
NOTES:

- S1-1—S1-8 NR select switch (shown in OUT position: (1) Dolby NR, (2) OUT, (3) dbx tape, (4) dbx disc)
- S606 Auto tape select switch (For Normal/CrO₂ tape)
- S607 Auto tape select switch (For Metal tape)

Mode	S606	S607
Normal	on	on
CrO ₂	on	off
Metal	off	off

- VR1, 2 Input level controls.
- VR3, 4 Output level control.
- VR5, 6 Playback gain adjustment VR.
- VR7, 8 Recording gain adjustment VR.
- VR9, 10 Bias current adjustment VR.
- VR201, 202 VCA symmetry adjustment VR.
- VR203, 204 RMS detector adjustment VR.
- VR205, 206 dbx standard level adjustment VR (Encode).
- VR207, 208 dbx standard level adjustment VR (Decode).
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000 (Ω), 1M = 1,000 k (Ω)
- Capacity are in microfarads (μF) unless specified otherwise.
P = Pico-farads.
- The mark (▼) shows test point, e.g. v = test point 1.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position otherwise specified.
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and diodes. One type of number is used for supply parts number and production parts number when they are identical.
e.g. Q1
2SC1844 (E, F) ◀ Production parts number
[2SC1844E] ◀ Supply parts number
D212
1S2473777 ◀ Production parts number.
[MA161] ◀ Supply parts numbers
- The supply parts number is described alone in the replacement parts list.
- This schematic diagram may be modified at any time with the development of new technology.

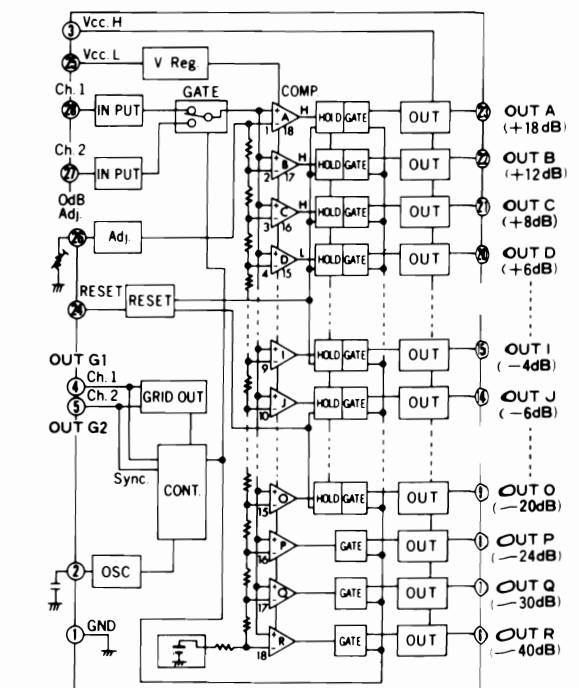
SCHEMATIC DIAGRAM MECHANISM CONTROL SECTION



- NOTES:**
- VR501: Input scanning time adjustment VR
 - S501: Counter reset switch
 - S502: Pause switch
 - S503: Record switch
 - S504: Stop switch
 - S505: Playback switch
 - S506: Fast Forward switch
 - S507: Rewind switch
 - S508: Record mute switch
 - S509: Memory repeat switch
 - S510: Tape/Time select switch
 - S511: Set switch
 - S512: Music select switch
 - S513: Timer switch (shown in REC position: (1) REC, (2) OFF, (3) PLAY)
 - S601: Accidental erase prevention switch
 - S602: Mode switch
 - S603: Stop switch
 - S604: Playback switch
 - S605: Cassette detection switch
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000 (Ω), 1M = 1,000 k(Ω).
Capacity are in microfarads (μ F) unless specified otherwise.
P = Pico-farads.
The mark (∇) shows test point. e.g. ∇ = Test point 1.
All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position.
However, the voltage in record mode is indicated in () when it differs from that in record mode.
For measurement, use VTVM.
($\rightarrow$) indicates B + (bias).
- The supply parts number is described alone in the replacement parts list.
- This schematic diagram may be modified at any time with the development of new technology.**

EQUIVALENT CIRCUITS

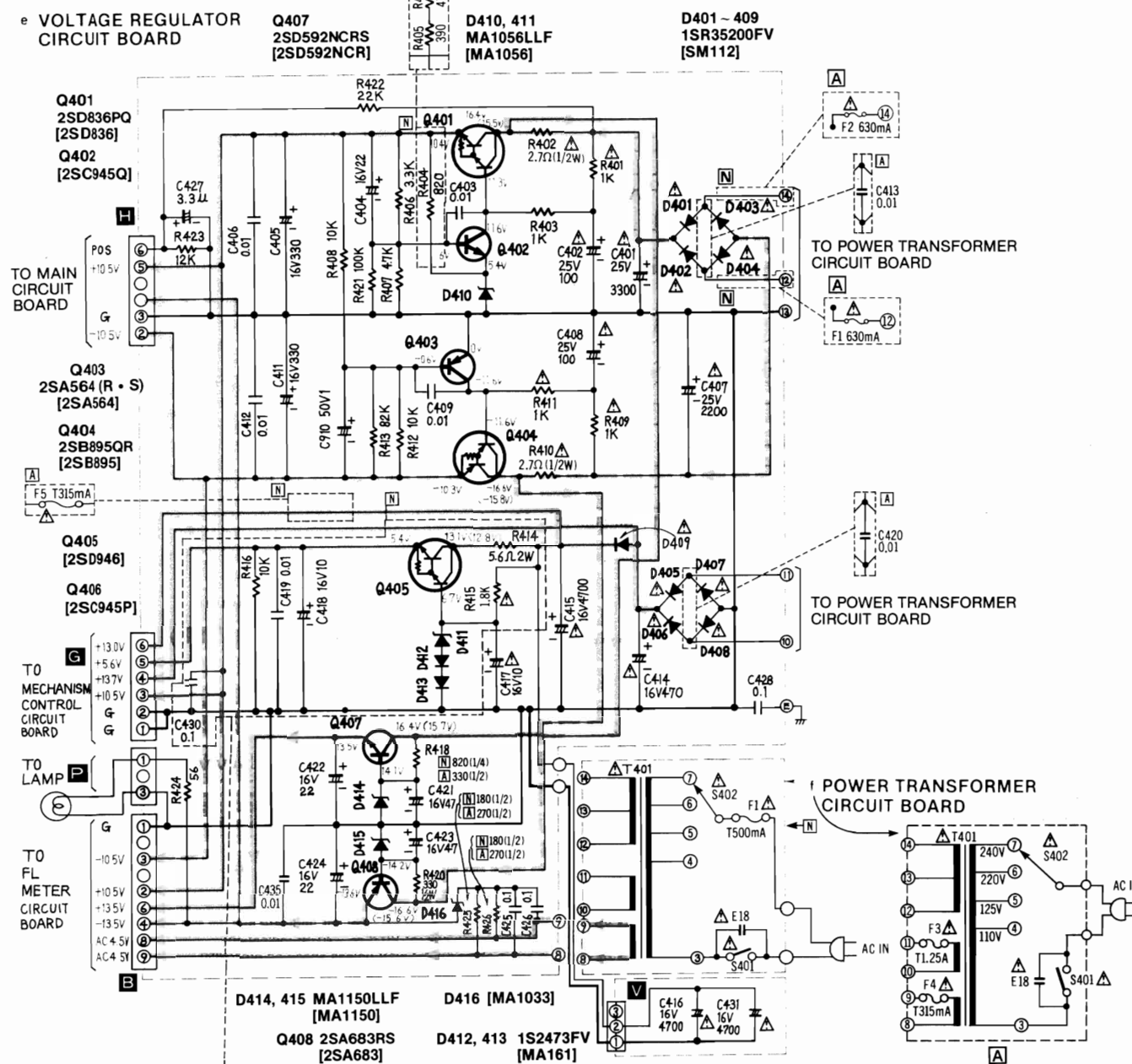
IC301 AN6870



SCHEMATIC DIAGRAM

POWER SUPPLY SECTION

NOTES:
 [N] ...For Asia, Latin America, Middle East and Africa areas.
 [A] ...For Australia.



NOTES:
 • S401, ... Power ON/OFF switch.
 • S402, ... AC power voltage select switch.
 • Resistances are in ohms (Ω), 1/4 watt unless specified otherwise.
 1K = 1,000 (Ω), 1M = 1,000 k(Ω).
 • Capacities are in microfarads (μF) unless specified otherwise.
 P = Pico-farads.
 • All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position.
 However, the voltage in record mode is indicated in () when it differs from that in record mode.
 For measurement use VTVM.

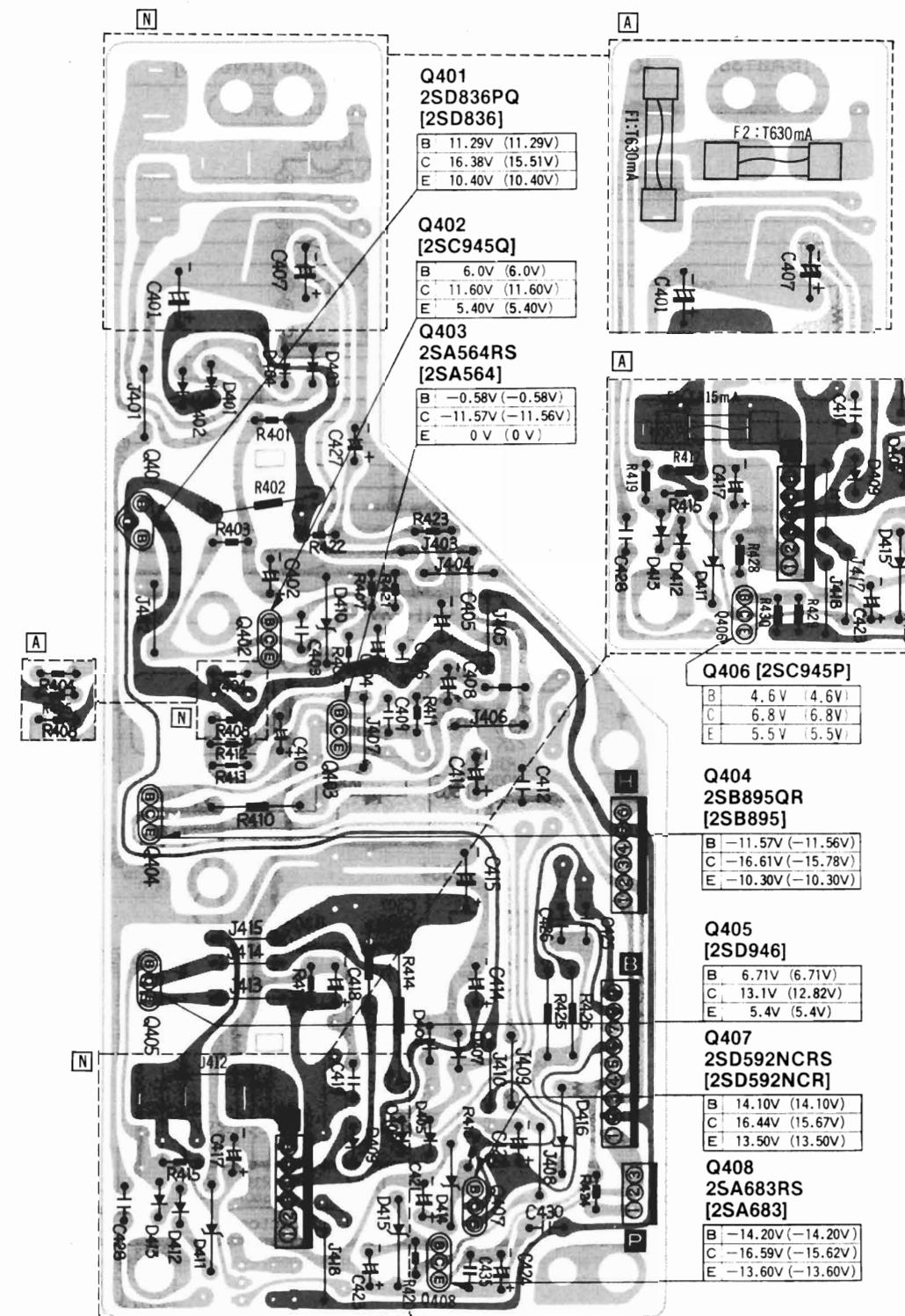
Important safety notice
 Components identified by Δ mark have special characteristics important for safety.
 When replacing any of these components, use only manufacturer's specified parts.

- () indicates B + (bias).
- () indicates B - (bias).
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors are diodes. One type of number is used for supply parts number and production parts number when they are identical.
 e.g. Q1
 2SC1844(E,F) ← Production parts number
 [2SC1844E] ← Supply parts number
 D301
 QVD1S2473T ← Production parts number
 [MA161] ← Supply parts
- The supply parts number is described alone in the replacement parts list.
- **This schematic diagram may be modified at any time with the development of new technology.**

CIRCUIT BOARD

VOLTAGE REGULATOR CIRCUIT BOARD

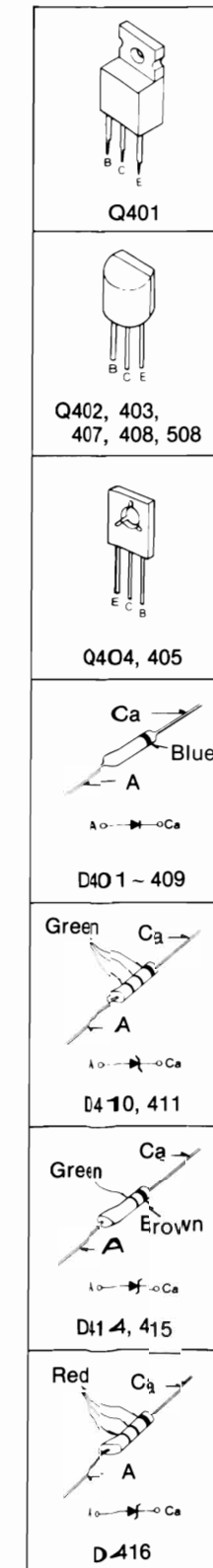
NOTES:
 [N] ...For Asia, Latin America, Middle East and Africa areas.
 [A] ...For Australia.



- NOTES:**
- The circuit shown in [N] on the conductor is B + (bias) circuit.
 - The circuit shown in [A] on the conductor is B - (bias) circuit.
 - The circuit shown in [] on the conductor side indicates printed circuit on the back side of the printed circuit board.
 - Values indicated in () are DC voltage between the ground and electrical parts.
 - The voltage indicates are measured during playback mode. However, the voltage in record mode is indicated in () when it differs from that in record mode.

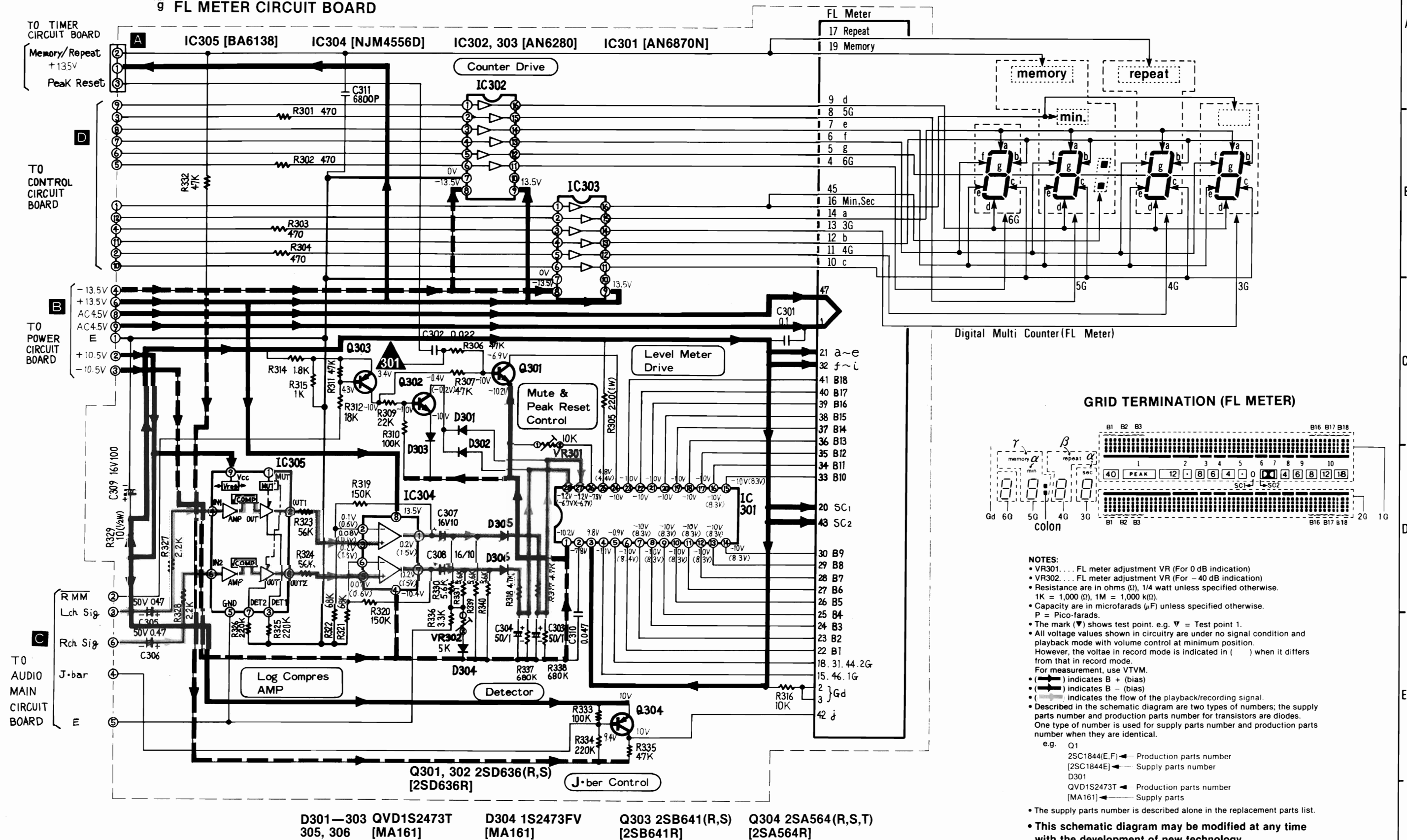
• **This circuit board diagram may be modified at any time with the development of new technology.**

TERMINATIONS



FL METER SECTION

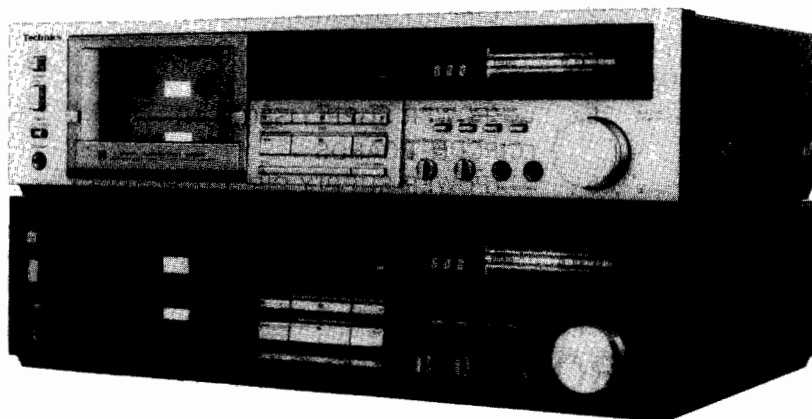
9 FL METER CIRCUIT BOARD



Service Manual

Cassette Deck
RS-M255X
 (Silver Face)
 (Black Face)

dbx Equipped Cassette Deck with
 Electronic Multi-Mode Counter



This is the Service Manual for the following areas.

- For all European areas except United Kingdom.
 ☒ For United Kingdom.

RS-M250 MECHANISM SERIES

Specifications

Track system:	4-track 2-channel stereo recording and playback	Fast forward and
Tape speed:	4.8cm/s	rewind time: Approx. 90 seconds with C-60 cassette tape
Wow and flutter:	0.038 % (WRMS), ± 0.13 % (DIN)	Inputs:
Frequency response: Metal tape;	20–20,000Hz	MIC; sensitivity 0.25 mV, applicable microphone impedance 400 Ω –10 k Ω
	25–18,000Hz (DIN)	LINE; sensitivity 60 mV, input impedance 47 k Ω
	30–17,000Hz ± 3 dB	Outputs:
CrO ₂ tape;	20–19,000Hz	LINE; output level 700 mV, load impedance 22 k Ω over
	25–18,000Hz (DIN)	HEADPHONES; output level 125 mV (at 8 Ω)
	30–16,000Hz ± 3 dB	Bias frequency:
Normal tape;	20–18,000Hz	85 kHz
	25–16,000Hz (DIN)	Motor:
	30–15,000Hz ± 3 dB	2-motor system
Dynamic range:	110 dB (at 1 kHz) with dbx in	Heads:
Max. input level		2-head system
improvement:	10 dB or more improved with dbx in (at 1 kHz)	1-SX (Sendust Extra) head for record/playback
Signal-to-noise ratio: dbx* in; 92 dB		1-double-gap ferrite head for erasure
	Dolby** NR in; 68 dB (above 5 kHz)	Power requirement:
	Dolby NR out; 58 dB (signal level = max. input level A weighted, CrO ₂ type tape)	AC; 110/125/220/240 V, 50-60 Hz
		Pre-set power voltage 220 V
		240 V for United Kingdom
		Power consumption: 28 W
		Dimensions:
		43.0 cm(W) $\times$ 10.8 cm(H) $\times$ 33.1 cm(D)
		Weight:
		6.0 kg

Specifications are subject to change without notice.

* The term dbx is a registered trademark of dbx Inc.

** 'Dolby' and the double-D symbol are trademarks of Dolby Laboratories.

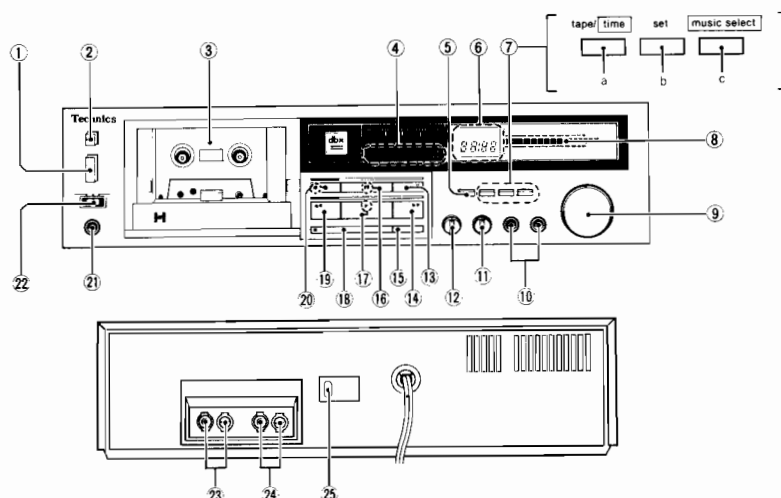
Technics

Matsushita Electric Trading Co., Ltd.
 P.O. Box 288, Central Osaka Japan

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LOCATION OF CONTROLS AND COMPONENTS



- | | |
|--|--|
| <ul style="list-style-type: none"> ① Power switch [power (push on)] ② Eject button [eject] ③ Cassette holder ④ Tape indicator [Auto Tape Select (Normal • CrO₂ • Metal)] ⑤ Memory repeat button [memory repeat (off • on)] ⑥ Digital multi counter [multi counter] ⑦ Counter mode select button [multi counter mode] a) Tape/time select button [tape/] b) Set button [set] c) Music select button [] ⑧ FL (fluorescent level) meter ⑨ Input level controls [input level (L • R)] ⑩ Microphone jacks [mic (L • R)] ⑪ Output level control [output level] ⑫ Noise reduction select switch | <ul style="list-style-type: none"> [Noise Reduction (Dolby NR • out • tape • disc)] ⑬ Record muting button (rec mute ()) ⑭ Fast forward button [ff (M • S) ()] ⑮ Counter reset button [counter reset] ⑯ Pause button and indicator [pause ()] ⑰ Play button and indicator [play ()] ⑱ Stop button [stop ()] ⑲ Rewind button [rew (M • S) ()] ⑳ Record button and indicator [rec ()] ㉑ Headphones jack [phones] ㉒ Timer start switch [timer (rec • off • play)] ㉓ Line output jacks [LINE OUT (R • L)] ㉔ Line input jacks [LINE IN (R • L)] ㉕ Voltage selector [VOLTAGE SELECTOR] |
|--|--|

OPERATING INSTRUCTION

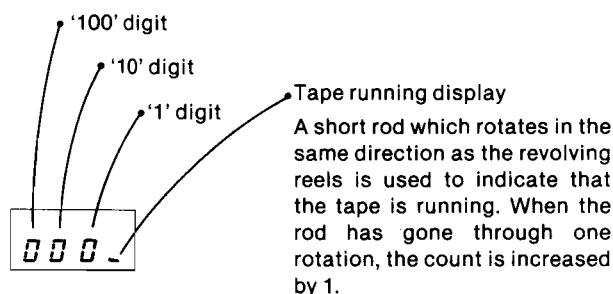
Digital multi counter

The Digital multi counter can be used in combination with the memory repeat, music select, record muting and pause functions.

(1) Using it as a tape counter

The 3-digit digital counter featured in this unit displays a count which is virtually identical to that of Technics' mechanical counter. With a C-60 tape, the count reaches about 400, with a C-90 tape about 600 and with a C-120 tape about 800. The tape counter is employed to read out the tape position by means of the counter figures and so program search can be performed easily.

Tape counter readout



Setting to "000"

- When the Power switch is pushed and the power switched on, the counter is reset to "000".
- When other displays appear on the Digital multi counter, set to "000" in the sequence given in the table below.

Present display	"000" setting procedure
Tape counter 	Depress the Counter reset button
Remaining time counter 	1. Depress the Tape/time select button. 2. Depress the Counter reset button.
Skipping programs 	1. Depress the Music select button. 2. When the time display appears, depress the Tape/time select button and switch over to the tape counter display. 3. Depress the Counter reset button

(2) Displaying the remaining tape time

The remaining time on the tape is displayed by setting the time at the beginning of the tape in accordance with the length of the tape, and while the tape is running in the recording mode, the time is counted down.

A 30-minute recording can be made on one side with a C-60 tape. When the remaining time counter is set to "30:00" at the beginning of the tape and recording commenced, the counter will show how many minutes of recording are left on the side of the tape being recorded.

- When the counter is functioning as a tape counter or is displaying a different indication, change over to the remaining time counter display in the sequence given in the table below.

Present display	Procedure for selection
Tape counter 	Depress the Tape/time select button.
Skipping programs 	1. Depress the Music select button. 2. When the tape counter display appears, depress the Tape/time select button.

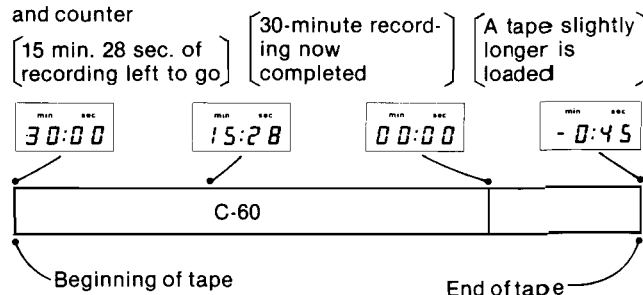
- Set the time in accordance with the tape length. Every time the Set button is depressed, the counter goes through the following indications: "15:00", "23:00", "30:00", "45:00" and "60:00". Set the time in accordance with the tape length, referring to the table below.

Tape length	Set time	One-side recording time (min.)
C — 30	15:00	15
C — 46	23:00	23
C — 60	30:00	30
C — 90	45:00	45
C — 120	60:00	60

- * Some tapes with a non-standard length are sold. When using one of these, set the time to the closest value in the above table.

4. Start the recording

The tape runs and as the amount of tape remaining decreases, the time indicated on the counter also decreases. The figure below shows the relationship between the tape and counter



Notes:

- Do not depress the Fast forward or Rewind button while the remaining tape time is being displayed. This action will cause the counter to function as a tape counter and make it unable to display the correct remaining tape time.
- If the Tape/time select button is depressed when changing over to the remaining time counter, "12:34" or "-0:02" will be displayed. This is not the remaining tape time display.
To find out the precise remaining tape time, it is necessary for the time to be set at the beginning of the tape.

(3) Displaying the record muting time

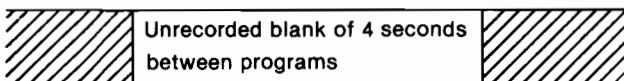
When the Record muting button is depressed during recording, the Digital multi counter starts counting each passing second and no sound is recorded on the tape. The function can be used to create unrecorded blanks on

Operate as follows:

- Prepare to operate
 - Depress the Stop button and stop the tape at its beginning.
 - Set the Memory repeat button to the "off" position.

the tape of the required length. Blanks of about 4 seconds are required for the music selector to work accurately.

- Given below is the procedure for creating unrecorded blanks of 4 seconds.



1 When a blank 4 seconds long is to be created from this position on the tape:

1 2 3 .

2 Depress the Record muting button.

00:00

4 seconds have elapsed.

4 When recording is to be resumed, depress the Play button.

1 2 4 .

3 Depress the Pause button now.

00:04

(4) Skipping programs

It is possible to skip up to 20 programs.

Operate as follows:

1. Prepare to operate.

- Set the Memory repeat button to the "off" position.
- Depress the Music select button and make the Digital multi counter indicate "00".

2. Set the number of programs to be skipped.

- Every time the Set button is depressed, the number increases by 1. Set to the desired number.
- To reset the number of programs to be skipped (for instance, "03" has been set although "02" was initially desired), depress the Music select button twice to make the counter display "00", and then depress the Set button to set the desired number.

3. Depress the Fast forward or Rewind button.

- Playback starts automatically as soon as the tape reaches the start of the required program.
- The digital multi counter display decreases by 1 every time a gap between programs is detected, and when playback begins, it changes over to the tape counter function.

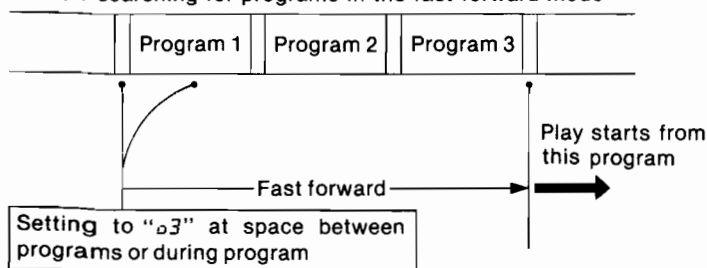
Notes:

- The number of programs to be skipped can be set in either the stop or playback mode. When the Pause or Stop button is depressed immediately after the setting has been made in the playback mode, the setting is released. When the Pause or Play button is depressed immediately after the setting has been made in the stop mode, the setting may be released.
- When the Stop or Play button is depressed when searching for a program, the skipping program search mode is released.

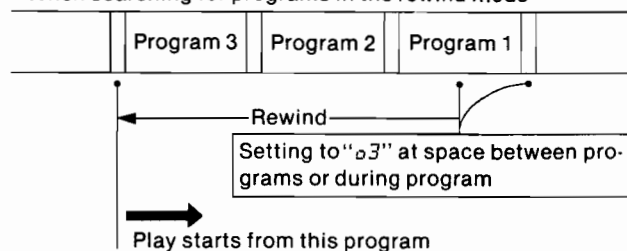
Counting the number of programs to be skipped

■ When "03" has been set

- When searching for programs in the fast forward mode



- When searching for programs in the rewind mode



■ When "00" has been set

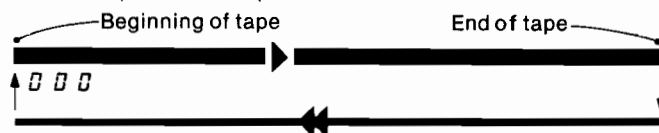
- When the tape is fast forwarded, playback will begin from the program following that now heard.
- When the tape is rewound, playback will begin from the start of the program now heard.

(5) Memory repeat playback

When playing back the whole tape repeatedly

- Set the tape counter to "000" at the position corresponding to the beginning of the tape.
- Set the Memory repeat button to the "on" position.
- Depress the Play button and make the tape run.

When the tape comes to the end, it is rewound automatically and playback begins again automatically from the beginning. This operation is continued 16 times unless the Stop button is depressed.

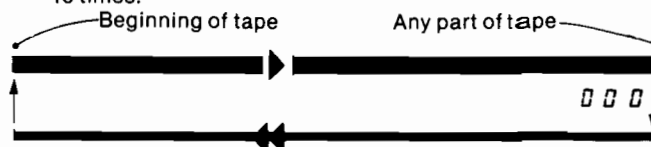


Note:

- Since "000" is detected at the end of the tape, the number of repeats may be reduced to a minimum of 8, depending on the state of the tape.

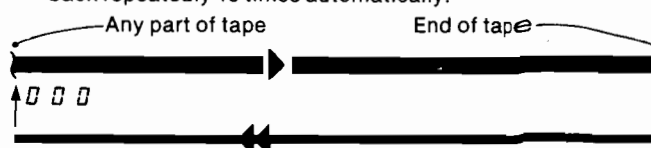
Repeat playback from tape beginning to program somewhere on tape

- Set the tape counter to "000" at the position where the program whose play is to be repeated ends.
- Rewind the tape to the beginning.
- Set the Memory repeat button to the "on" position.
- Depress the Play button and make the tape run. The tape is rewound automatically to the "000" display and the same playback operation as above is repeated automatically for 16 times.



Repeat playback from a program somewhere on tape to tape end

- Set the tape counter to "000" at the position where the program is located.
- Set the Memory repeat button to the "on" position.
- Depress the Play button and make the tape run. The tape is automatically rewound at the end of the tape and the part of the tape from the "000" display to the end is played back repeatedly 16 times automatically.



Note:

- Always set the Memory repeat button to the "off" position after use.

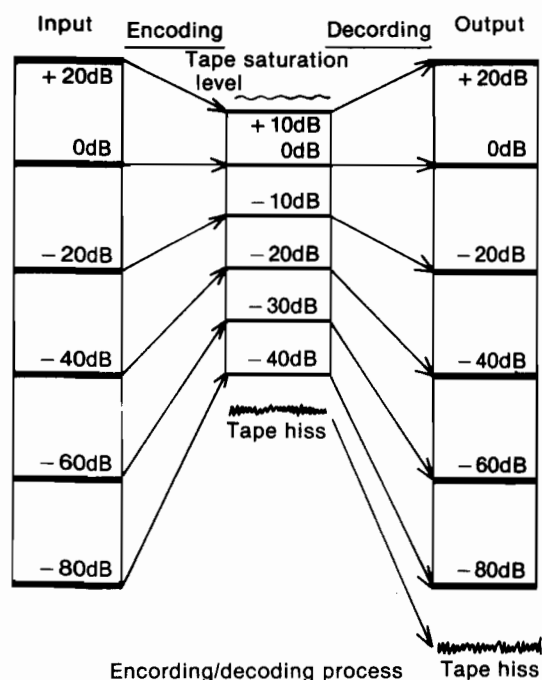
dbx noise reduction system

Features

1. Reduced noise over the whole audible frequency range (more than about "30dB" reduction).
2. The signal is compressed at a high recording level for recording to enable recording with minimal distortion and a wide dynamic range.
3. The linear logarithmic compression and expansion do not make the sound quality undergo change with level mismatching.

Principle of basic operation

The dbx system works to expand the dynamic range by compressing (encoding) the signals and then expanding (decoding) them. As shown in the figure, the input signal level is halved during recording onto the tape. During playback the halved level is doubled to restore the original signal. The figure shows that high signals are greatly expanded (from "+10 dB" to "+20 dB") while low signals are given a low expansion ("−40 dB" to "−80 dB"). This results in a great improvement in the dynamic range and simultaneously in a great reduction in tape hiss.



"disc" position for "dbx encoded discs"

This unit comes with a "[dbx] disc" position on the Noise reduction select switch for playing "dbx encoded discs."

Playing "dbx encoded discs"

Operate in the following sequence:

1. Set the input selector on the stereo amplifier to the "tape" position and the record selector to the "phono" position. If the amplifier is capable of tape monitor selection, set the tape monitor switch to the "tape" position and the input selector to the "phono" position.
2. Set the unit to the stop mode and then set the Noise reduction select switch to the "[dbx] disc" position. Disconnect the microphone if one has been connected to the unit.

3. Start operating the turntable.

4. Adjust the unit's Input level controls so that the Fluorescent level meter illumination indicates around "0 dB".

5. Adjust the volume using the control on the stereo amplifier.

Note:

- Do not set the Noise reduction select switch to the "[dbx] disc" position during tape playback since the sound will then no longer be heard.

Some open-reel type dbx encoded tapes are now available from music stores. These tapes can be played back just like the records by setting the Noise reduction select switch to the "disc" position.

Recording "dbx encoded discs" onto tape

1. Set the Noise reduction select switch to the "[dbx] disc" position.
2. Adjust the recording level, following the "Recording level setting" instructions.
3. Start the recording.

The sound of the disc is recorded on the tape still in encoded (compressed) form. The decoded (expanded) sound can, however, be monitored (through both the speakers connected to the amplifier and headphones connected to the unit). When playing back a tape which has been recorded in this way, set the Noise reduction select switch to the "[dbx] tape" position.

- * Unlike ordinary records, "dbx encoded discs" have their sound dbx encoded (compressed) when it is cut into the sound grooves. This means that for replay, the sound must be returned to its original form through a decoder (expander). As a result, the noise level is reduced and the dynamic range is increased for a higher record play quality.

Recording with Dolby NR

This unit includes the Dolby NR system, which reduces tape noise to a remarkable degree.

Briefly, the system works as follows: At low sound levels (where tape noise is most noticeable), the high-frequency portion of the sound is recorded at a higher level. Tape noise is not amplified.

During playback, the level of only that portion of the signal which was increased at the time of the recording, as well as tape noise, is reduced by a like amount. This causes the signal to be heard at a normal level, and the tape noise to be reduced significantly.

Noise reduction select switch

- [dbx] tape: Used for dbx recording and for replaying dbx recorded tapes.
- [dbx] disc: Used for playing dbx encoded discs on a turntable and for recording such discs.
- Dolby NR: Used for recording with the Dolby NR system and replaying tapes which have been recorded with the Dolby NR system.
- Out: Used when noise reduction is not required.

DISASSEMBLY INSTRUCTIONS



Fig. 1

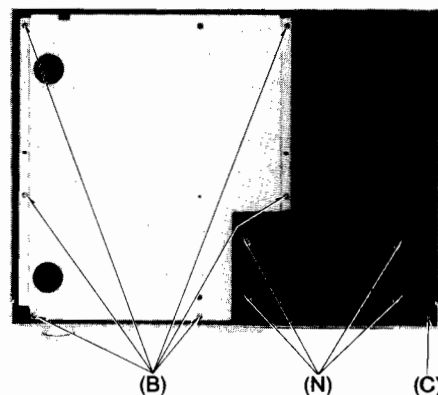


Fig. 2

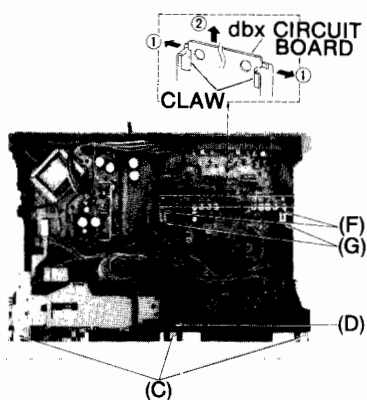


Fig. 3

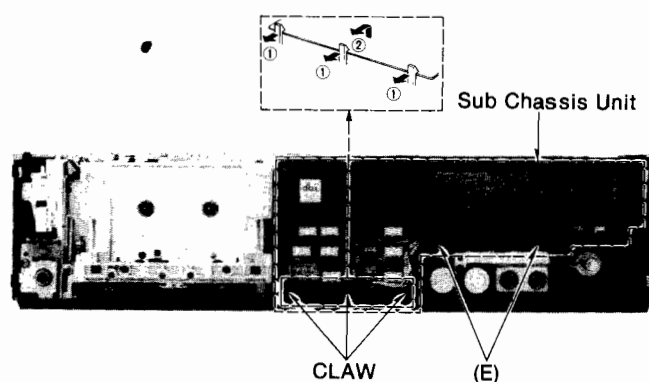


Fig. 4

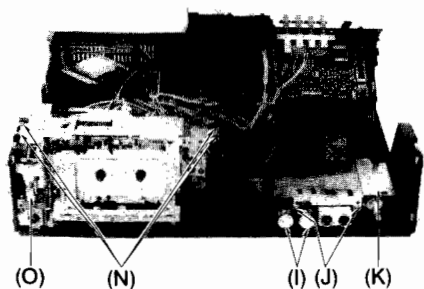


Fig. 5

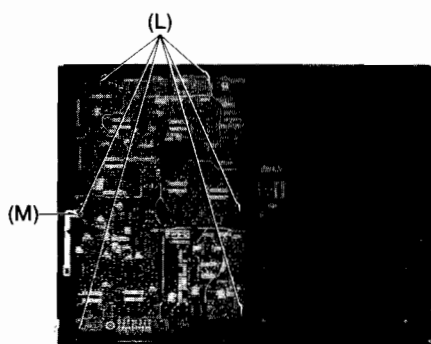


Fig. 6

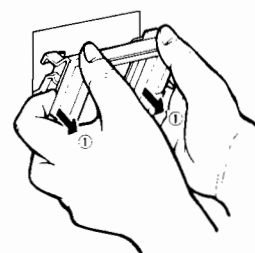


Fig. 7

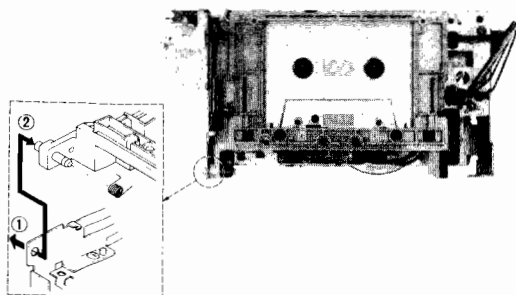


Fig. 8

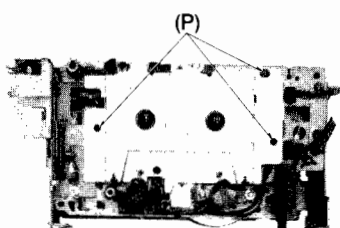


Fig. 9

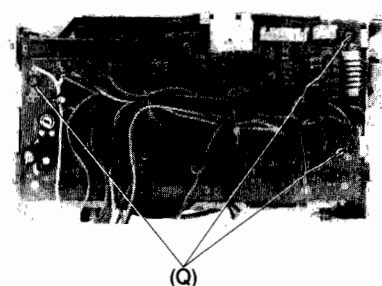
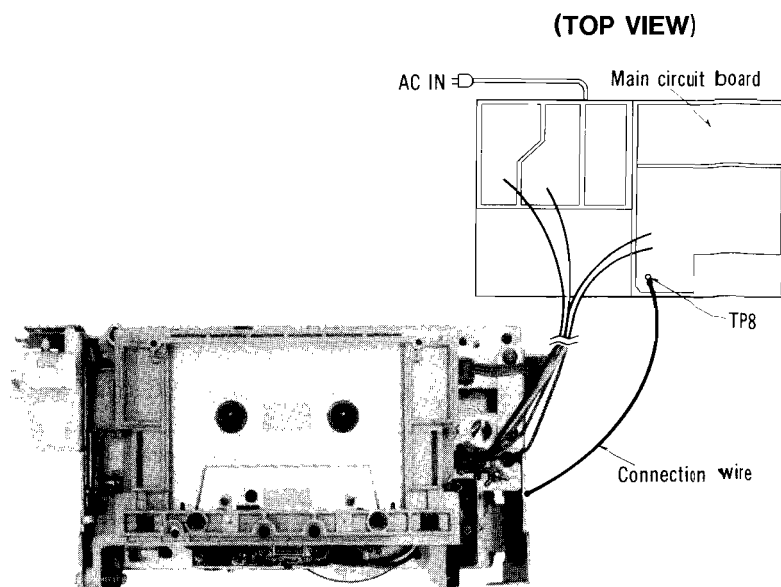


Fig. 10

Ref. No.	Procedure	To remove ———	Remove ———	Shown in fig. ———
1	1	Case cover	• 4 screws (A)	1
2	2	Bottom cover	• 6 screws (B)	2
3	1→2→3	Front panel	• 4 screws (C)	2, 3
4	1→2→3→4	Sub chassis unit	• 1 screw (D)	3
5	1→2→3→4→5	Push switch circuit board	• 2 screws (E)	4
6	1→2→3→4→6	Key board circuit board	• As shown in fig. 4, pull the claw in the direction of arrow ①, the pull key board circuit board in the direction of arrow ②. Then, it can be removed.	4
7	1→7	dbx circuit board	• 2 red screws (F)	3
			• dbx P.B. holder (G)	3
			• As shown in fig. 3, pull the claw in the direction of arrow ①, then pull dbx circuit board in the direction of arrow ②. Then, it can be removed.	3
8	1→2→3→4→7→8	Main circuit board	• 2 volume knobs (H)	1
			• 2 select knobs (I)	5
			• 2 screws (J)	5
			• Meter shield plate (K)	5
			• 6 red screws (L)	6
			• Earth plate-A (M)	6
9	1→2→3→4→9	Mechanism unit	• 8 screws (N)	2, 5
			• Power button (O)	5
10	10	Cassette lid	• As shown in fig. 7, pull in the direction of arrow ①. Then, it can be removed.	7
11	1→2→3→4→9→10→11	Cassette holder	• While pushing mechanical chassis in the direction of arrow ①, extract cassette holder in the direction of arrow ②.	8
12	1→2→3→4→9→10→11→12	Mechanism cover	• 3 screws (P)	9
13	1→2→3→4→9→13	Main control circuit board	• 3 screws (Q)	10

• MECHANISM SECTION

1. For repair, measurement or adjustment with the mechanism removed from the unit be sure to ground the lower base plate of the mechanism.
2. For grounding, connect a extension cord to the mechanism's lower base plate and TP8 (earth) from main circuit board.
3. Without grounding, the auto tape selector does not operate properly.



TECHNICAL EXPLANATION

• DISPLAY SECTION

1. DISPLAY TUBE

Internal display-tube connections are shown below.

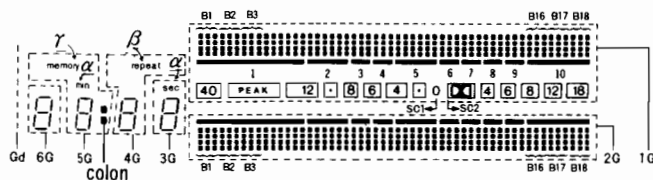


Fig. A

2. DIGITAL COUNTER

- During tape counter indication, tape count is displayed by the first three digits (6G, 5G, 4G). The bottom digit (fig. C) is used to indicate tape travel and direction as one of the segments (c), (d), (e) and (g) lights (counterclockwise rotation for PLAY and FF; clockwise for REW).
- For tape remaining time indication, all four digits and “:”, “min” and “sec” are used. For recording muting time indication, display elements are the same.
- Only lower two digits are used to indicate music selection (for jumping up to 20 selections). These functions of the digital counter are controlled by outputs from the microprocessor IC501 via FL driver IC302 and IC303.

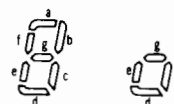


Fig. C

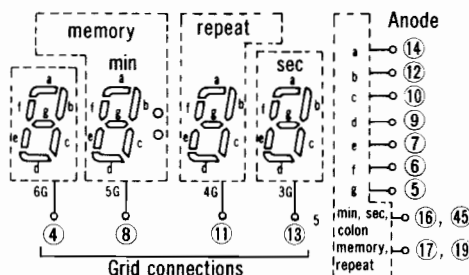


Fig. D

3. LEVEL METER

This model uses a level meter IC AN6870N for dynamic lighting indication, featuring a wide range of -40 dB to $+18\text{ dB}$ range.

BLOCK DIAGRAM

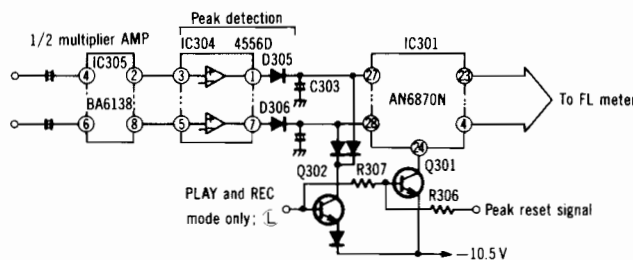


Fig. E

CIRCUIT OPERATION

Most conventional level meters using AN6870 (IC301) can only display levels in the range of -20 dB to $+8\text{ dB}$. RS-M255X using the same AN6870, however, is capable of covering a range of -40 dB to $+18\text{ dB}$, which is sufficient for the expanded dynamic range of dbx.

A conventional peak meter circuit follows the IC304, which means a limited display range between -20 dB and $+8\text{ dB}$. To offset this, a 1/2 multiplier circuit is added to the pre-stage to double the display range.

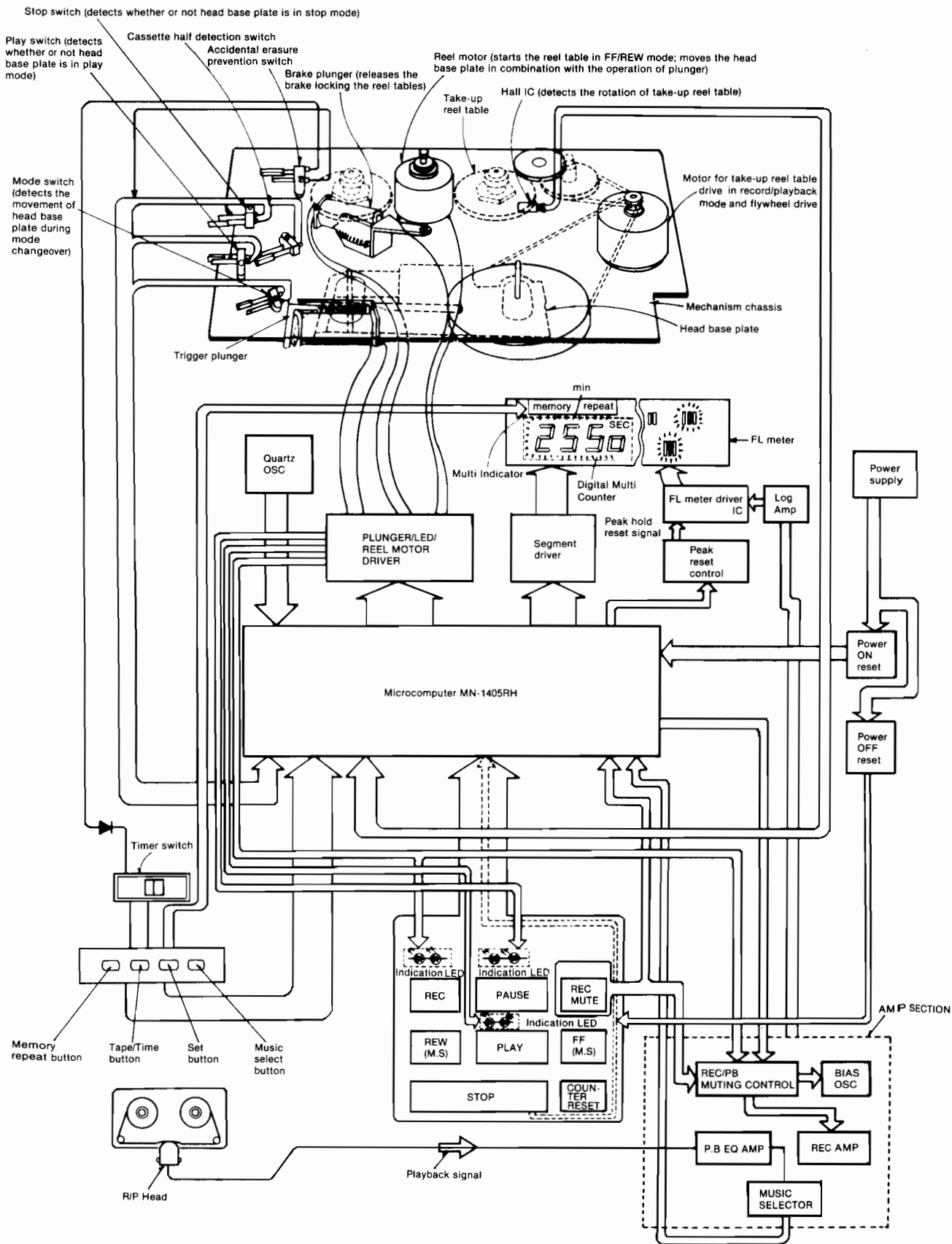
In other words, the dynamic range (58dB) of the input signal to IC305 (BA6138) is compressed to approximately half (multiplied by 1/2) to obtain a 28dB dynamic range for the signal to the meter circuit.

Sound signal (AC signal) is inputted to this IC, which outputs a DC signal converted to half of the input.

Level meter indication	Changes in terminal voltages of IC305		LINE OUT voltage
	Pin ④ or ⑥	Pin ② or ⑧	
+12 dB	+12 dB	around +6 dB	+12 dB (1600mV)
0 dB	0 dB	0 dB	0 dB (400mV)
-12 dB	-12 dB	around -6 dB	-12 dB (100mV)

• CONTROL SECTION

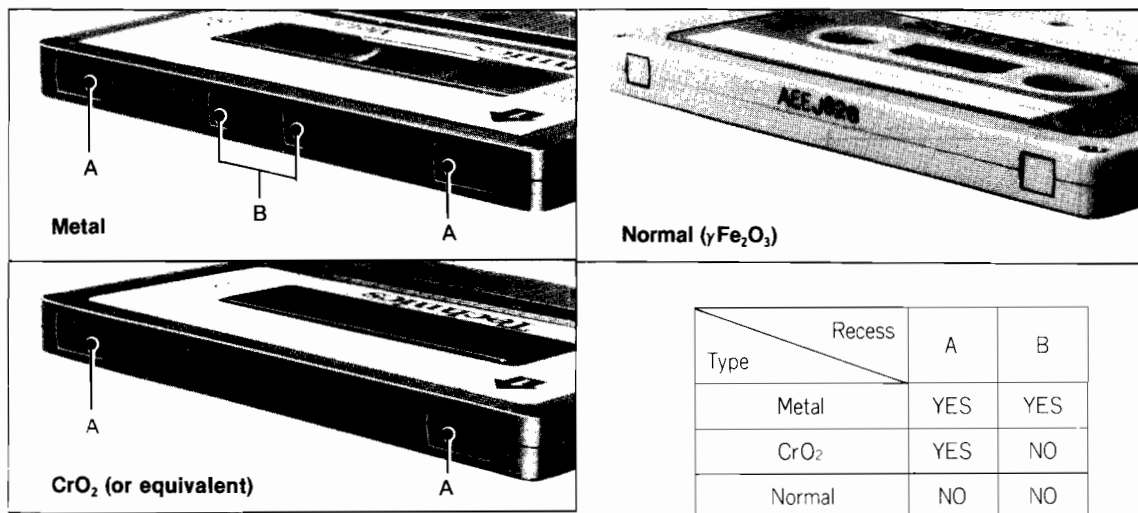
RS-M255X contains a microcomputer MN1405RH for various input control buttons, rotation detection, and operation commands. The microcomputer quickly processes signals received from the 19 control switches and a hall IC.



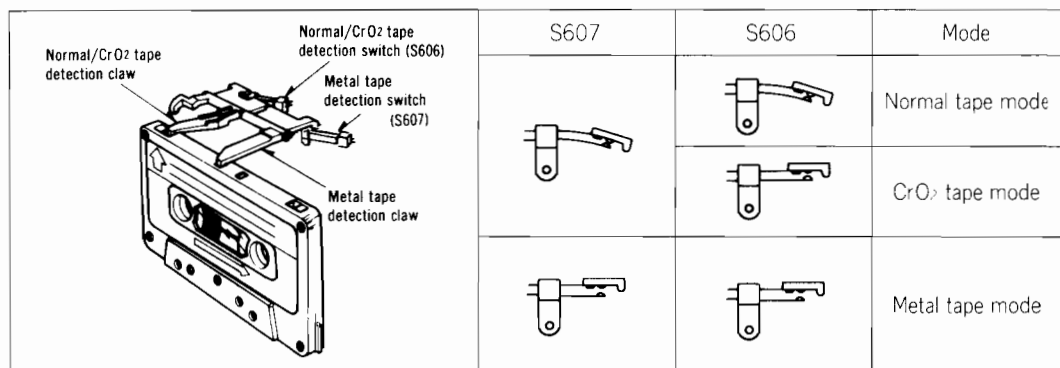
• AUTO TAPE SELECTOR

This unit is equipped with an auto-tape selector system that detects these identification recesses and automatically selects the correct bias and equalization for Normal, CrO₂ and Metal tape varieties.

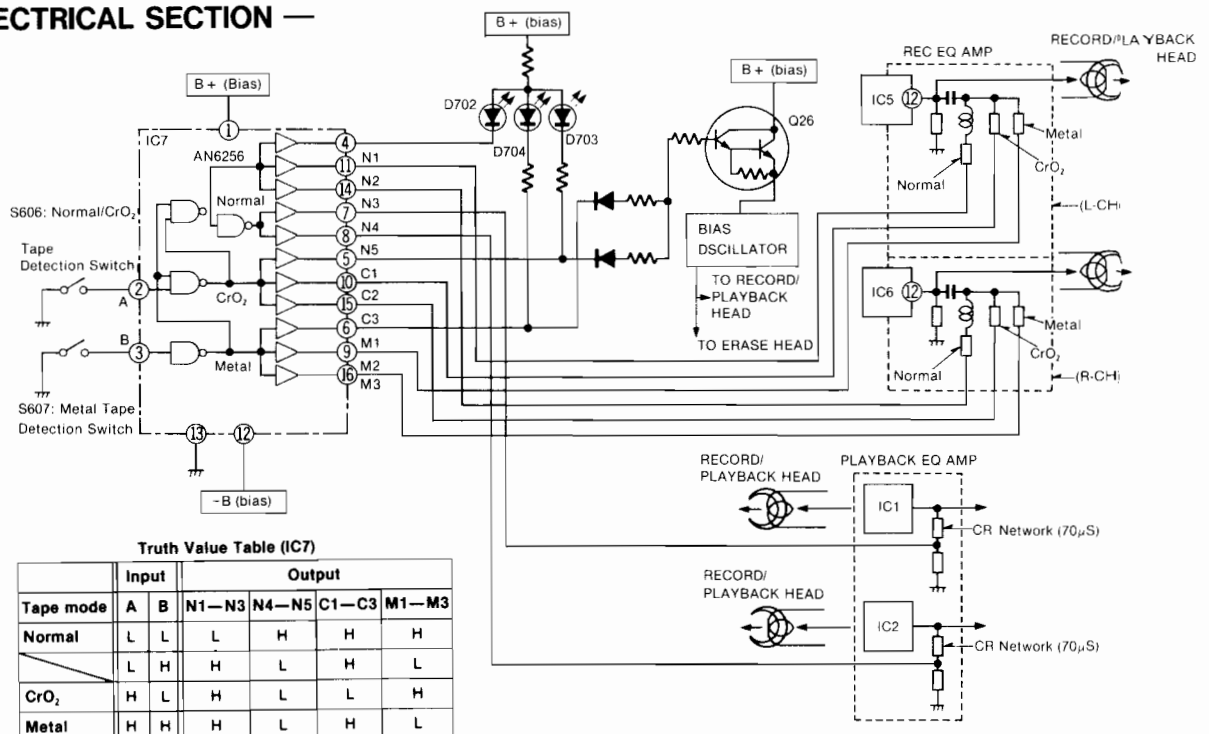
Thus, the novice user can obtain the correct tape selector setting automatically to ensure proper recording and playback results.



— MECHANICAL SECTION —



— ELECTRICAL SECTION —



MEASUREMENT & ADJUSTMENT METHODS

Tape selector (Tape mode switching)

For measurement adjustment with test tapes without tape detection holes (A and B), switch tape modes as follows.

(For normal tape mode, just insert a normal tape into the cassette holder.)

* Metal tape mode setting:

Metal tape mode is obtained by disconnecting the 3 pin socket  from the 3 pin post  on the P.C.B. (Printed Circuit Board).

* CrO₂ tape mode setting:

First, disconnect the 3 pin socket  in the same way as above. Then, as illustrated in the figure right, connect the terminal-3 of the 3 pin post to the ground with a connection wire.

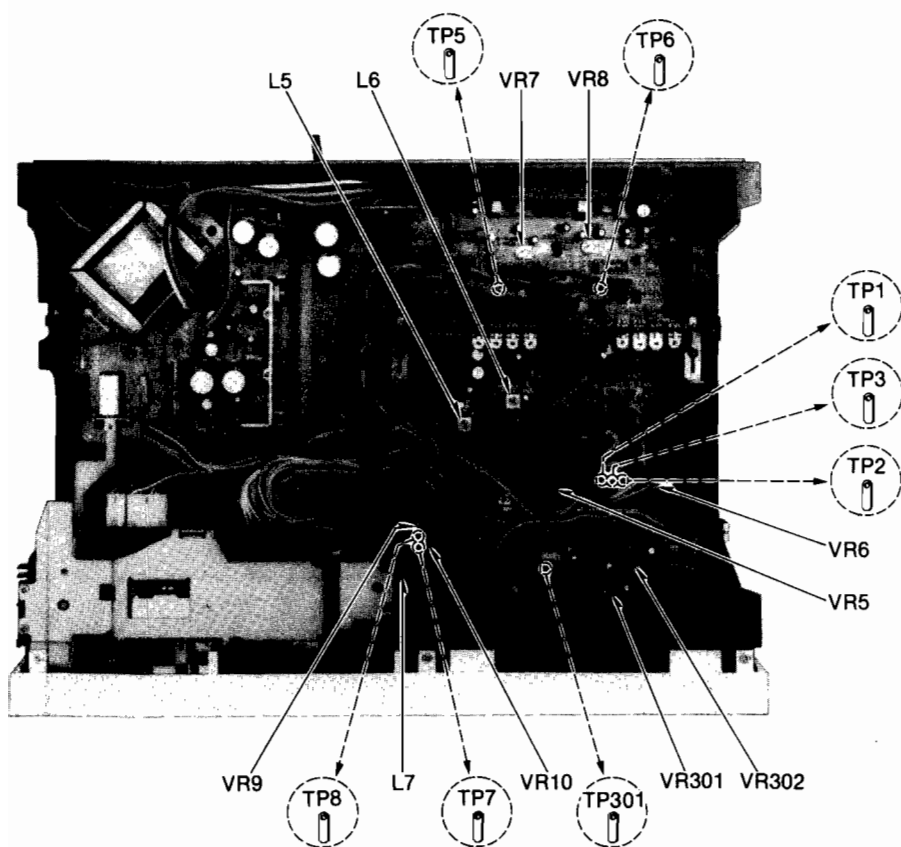
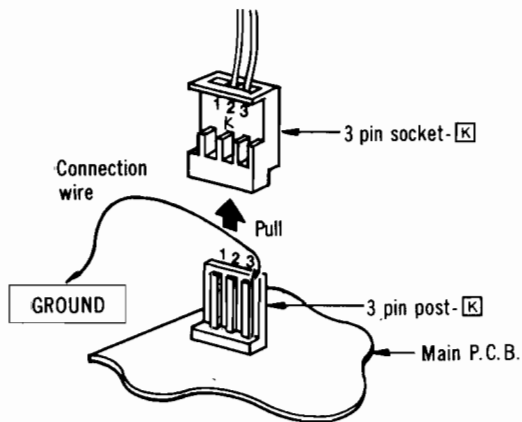
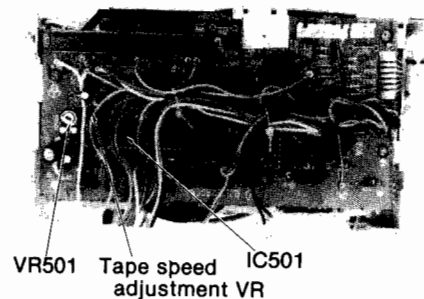


Fig. 1



NOTES: Keep good condition, set switches and controls in the following positions, unless otherwise specified.

- Make sure heads are clean.
- Make sure capstan and pressure roller are clean.
- Judgeable room temperature: $20 \pm 5^{\circ}\text{C}$ ($68 \pm 9^{\circ}\text{F}$)
- NR switch: OUT

- Timer start switch: OFF
- Input level controls: Maximum
- Output level control: Maximum

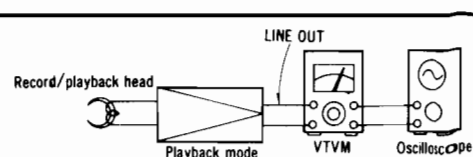
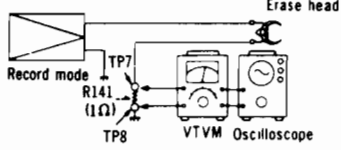
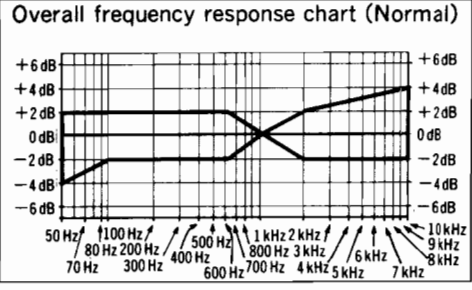
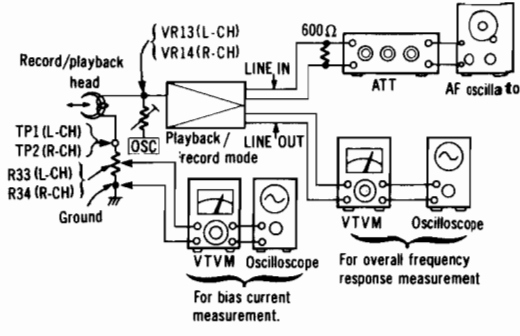
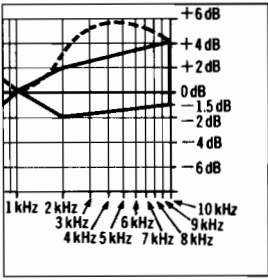
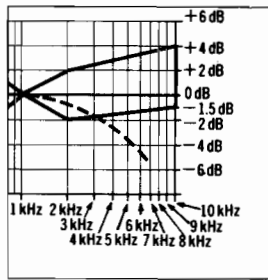
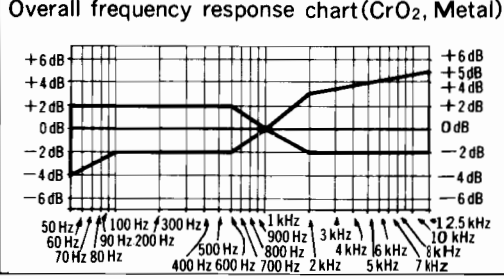
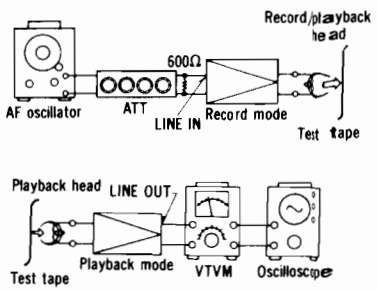
ITEM	MEASUREMENT & ADJUSTMENT
A Head azimuth adjustment Condition: • Playback mode	L-CH/R-CH output balance adjustment 1. Make connections as shown in fig. 2. 

Fig. 2

ITEM	MEASUREMENT & ADJUSTMENT
Equipment: • VTVM • Oscilloscope • Test tape (azimuth) ... QZZCFM	- Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) in fig. 3 for maximum output L-CH and R-CH levels. When the output levels of L-CH and R-CH are not at maximum at the same time, readjust as follows. - Turn the screw shown in fig. 3 to find angles A and C (points where peak output levels for left and right channels are obtained). Then, locate the angle B between angles A and C, i.e., a point where L-CH and R-CH output levels come together at maximum. (Refer to figs. 3 and 4.) L-CH/R-CH phase adjustment - Make connections as shown in fig. 5. - Playback the 8kHz signal from the test tape (QZZCFM). Adjust screw (B) shown in fig. 3 so that pointers of the two VTVMs swing to maximum and a waveform as illustrated in fig. 6 is obtained on the oscilloscope. Fig. 3 Fig. 4 Fig. 5 Fig. 6
Ⓑ Tape speed Condition: • Playback mode • Normal tape mode Equipment: • Digital electronic counter • Test tape ... QZZCWAT	Tape speed accuracy - Test equipment connection is shown in fig. 7. - Playback test tape (QZZCWAT 3,000Hz), and supply playback signal to frequency counter. - Measure this frequency. - On the basis of 3,000Hz, determine value by following formula: $\text{Tape speed accuracy} = \frac{f - 3,000}{3,000} \times 100 (\%)$ where, f = measured value - Take measurement at middle section of tape. Standard value: ±1.5% Adjustment method - Playback the test tape (middle). - Adjust so that frequency becomes 3,000 Hz. - Tape speed adjustment VR shown in fig. 1. Tape speed fluctuation Make measurements in same manner as above (beginning, middle and end of tape), and determine the difference between maximum and minimum values and calculate as follows: $\text{Tape speed fluctuation} = \frac{f_1 - f_2}{3,000} \times 1000 (\%)$ f_1 = maximum value, f_2 = minimum value Standard value: Less than 1.0%
Ⓒ Playback frequency response Condition: • Playback mode • Normal tape mode Equipment: • VTVM • Oscilloscope • Test tape ... QZZCFM	- Test equipment connection is shown in fig. 2. - Place UNIT into playback mode. - Playback the frequency response test tape (QZZCFM). - Measure output level at 12.5kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz and 63Hz, and compare each output level with the standard frequency 315Hz, at LINE OUT. - Make measurement for both channels. - Make sure that the measured value is within the range specified in the frequency response chart. (Shown in fig. 8.) Fig. 8

ITEM	MEASUREMENT & ADJUSTMENT
D Playback gain Condition: • Playback mode • Normal tape mode Equipment: • VTVM • Oscilloscope • Test tape ... QZZCFM	1. Test equipment connection is shown in fig. 2. 2. Playback standard recording level portion on test tape (QZZCFM 315Hz, 0 dB), and using VTVM measure the output level at LINE OUT jack. 3. Make measurement for both channels. Standard value: $0.7V \pm 1dB$ [around 0.42V: at test points TP5 (L-CH) and TP6 (R-CH)] Adjustment 1. If measured value is not within standard, adjust VR5 (L-CH), VR6 (R-CH) (shown in fig. 1). 2. After adjustment, check "Playback frequency response" again.
E Erase current Condition: • Record mode • Metal tape mode Equipment: • VTVM • Oscilloscope	1. Test equipment connection is shown in fig. 9. 2. Place UNIT into metal tape mode. 3. Press the record and pause buttons. 4. Read voltage on VTVM and calculate erase current by following formula: $\text{Erase current (A)} = \frac{\text{Voltage across both ends of R141}}{1 (\Omega)}$ Standard value: $155 \pm 15 \text{ mA}$ (Metal position)  Fig. 9 5. If measured value is not within standard, adjust as follows. Adjustment 1. Open the point (B) and short the point (A) on the main circuit board in the circuit board diagram (See page 41). 2. Make measurement for erase current. 3. Make sure that the measured value is within the erase current of 140mA to 170mA. 4. If it is beyond the value, carry out the following adjustments: • If the erase current is less than 140mA, open the point (A). • If the erase current is more than 170mA, short the points (A) and (B).
F Overall frequency response Condition: • Record/playback mode • Normal tape mode • CrO₂ tape mode • Metal tape mode • Input level controls ... MAX • Output level control ... MAX Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω) • Test tape (reference blank tape) ... QZZCRA for Normal ... QZZCRX for CrO₂ ... QZZCRZ for Metal	Note: Before measuring and adjusting, make sure of the playback frequency response (For the method of measurement, please refer to the playback frequency response). Overall frequency response adjustment by recording bias current (Recording equalizer is fixed) 1. Make connections as shown in fig. 11. 2. Place UNIT into normal tape mode and load the test tape (QZZCRA). 3. Input a 1kHz, -24 dB signal through LINE IN. Place the set in record mode. 4. Fine adjust the attenuator to obtain 0.7V LINE OUT output. • Make sure that the input signal level is $-24 \pm 4 \text{ dB}$ with 0.7V output voltage. 5. Adjust the attenuator to reduce the input signal level by 20dB. 6. Adjust the AF oscillator to generate 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz and 10kHz signals, and record these signals on the test tape. 7. Playback the signals recorded in step 6, and check if the frequency response curve is within the limits shown in the overall frequency response chart for normal tapes (fig. 10). (If the curve is within the charted specifications, proceed to steps 8, 9, 10 and 11.) If the curve is not within the charted specifications, adjust as follows;  Fig. 10  Fig. 11

ITEM	MEASUREMENT & ADJUSTMENT
	Adjustment ①: When the curve exceeds the overall frequency response chart specifications (fig. 10) as shown in fig. 12.  Fig. 12 1) Increase bias current by turning VR9 (L-CH) and VR10 (R-CH). (See fig. 1 on page 11.) 2) Repeat steps 6 and 7 to confirm. (Proceed to steps 8, 9, 10 and 11 if the curve is now within the charted specifications in fig. 10.) 3) If the curve still exceeds the specifications (fig. 10), increase bias current further and repeat steps 6 and 7. 8. Place UNIT into CrO₂ tape mode. 9. Change test tape to QZZCRX, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz and 12.5 kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for CrO₂ tapes (fig. 14). 10. Place UNIT into metal tape mode change test tape to QZZCRZ, and record 50 Hz, 100 Hz, 200 Hz, 500 Hz, 1 kHz, 4 kHz, 8 kHz, 10 kHz and 12.5 kHz signals. Then, playback the signals and check if the curve is within the limits shown in the overall frequency response chart for metal tapes (fig. 14). 11. Confirm that bias currents are approximately as follows when the UNIT is set at different tape mode. * Read voltage on VTVM and calculate bias current by following formula: $\text{Bias current (A)} = \frac{\text{Value read on VTVM (V)}}{10 (\Omega)}$ Standard value: around 340 μA (Normal position) around 440 μA (CrO₂ position) around 710 μA (Metal position) Adjustment ②: When the curve falls below the overall frequency response chart specifications (fig. 10) as shown in fig. 13.  Fig. 13 1) Reduce bias current by turning VR9 (L-CH) and VR10 (R-CH). 2) Repeat steps 6 and 7 to confirm. (Proceed to steps 8, 9, 10 and 11 if the curve is now within the charted specifications in fig. 10.) 3) If the curve still falls below the charted specifications (fig. 10), reduce bias current further and repeat steps 6 and 7. Overall frequency response chart (CrO₂, Metal)  Fig. 14
⑥ Overall gain Condition: * Record/playback mode * Normal tape mode * Input level controls ... MAX * Output level control ... MAX * Standard input level: MIC -72 $\pm$ 3 dB LINE IN ... -24 $\pm$ 3 dB Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600 Ω) * Test tape (reference blank tape) ... QZZCRA for Normal	1. Test equipment connection is shown in fig. 15. 2. Place UNIT into normal tape mode, and load the test tape (QZZCRA). 3. Place UNIT into record mode. 4. Supply 1 kHz signal (-24 dB) from AF oscillator, through ATT to LINE IN. 5. Adjust ATT until monitor level at LINE OUT becomes 0.7 V. 6. Playback recorded tape, and make sure the value at LINE OUT on VTVM becomes 0.7 V. 7. If measured value is not 0.7 V, adjust VR7 (L-CH), VR8 (R-CH). 8. Repeat from step (2).  Fig. 15

ITEM	MEASUREMENT & ADJUSTMENT
Ⓜ Fluorescent meter Condition: * Record mode * Input level controls ... MAX * Output level control ... MAX Equipment: * VTVM * AF oscillator * ATT	1. Make connections as shown (See fig. 15). 2. Connect a wire between TP301 and ground terminal (See fig. 16). 3. In the recording pause mode, apply 1 kHz (−24 dB) to LINE IN. 4. Adjust ATT so that output level at LINE OUT is 0.7V. −40dB adjustment 5. Adjust ATT so that the level adjusted at step 4 is reduced by 40 dB. 6. At this time, check that −40 dB indicator is lighted halfway (intermediate brightness between full brightness and light-out: See fig. 17). 7. If the indicator is not lighted halfway as described in step 6, adjust VR302. 0dB adjustment 8. Restore the condition of step 4 (set LINE OUT output level to 0.7V). 9. At this time, check that 0dB indicator is lighted halfway (intermediate brightness between full brightness and light-out: See fig. 18). 10. If improper, adjust VR301. 11. Repeat adjustments and checks at steps 4, 5, 6, 7, 8, 9 and 10 two or three times. 12. Disconnect the wire between TP301 and ground terminal, which had been connected at step 2.
① Dolby NR circuit Condition: * Record mode * Dolby NR switch ... IN/OUT * Input level controls ... MAX Equipment: * VTVM * AF oscillator * ATT * Oscilloscope * Resistor (600Ω)	1. Test equipment connection is shown in fig. 20. 2. Place UNIT into record mode, set the Dolby NR switch to OUT position and supply to LINE IN to obtain −34.5 dB at PIN ⑦ [IC3 (L-CH), IC4 (R-CH)] (frequency 5 kHz). 3. Confirm that the value at IN position is 8 (±2.5) dB greater than the value at OUT position of Dolby NR switch.
Ⓜ Input scanning time adjustment Condition: * Stop mode Equipment: * Oscilloscope	1. Connect oscilloscope to ⑩ terminal of IC501. 2. Measure the time of input scanning signal with oscilloscope as shown in fig. 20. Standard value: About 10 msec 3. If the measured value is markedly different from the signal shown below, make the necessary adjustment with VR501.

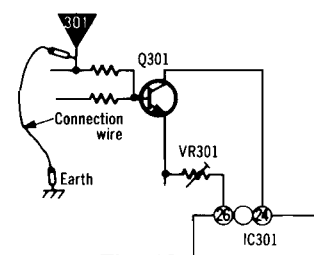


Fig. 16



Fig. 17



Fig. 18

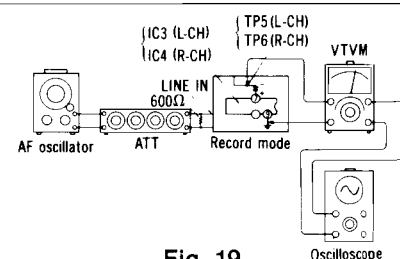


Fig. 19

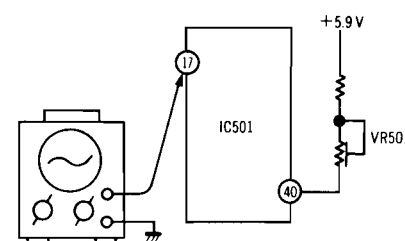
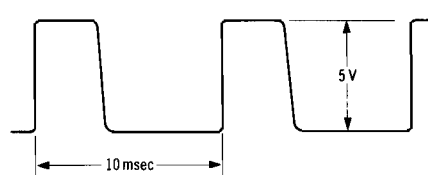
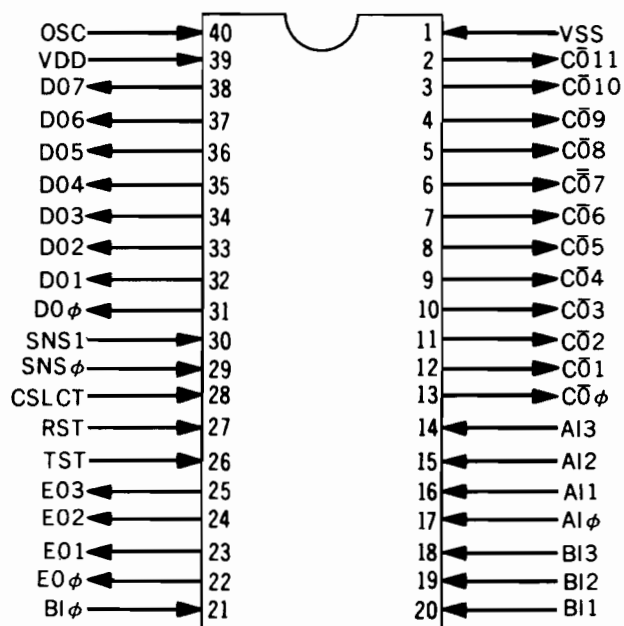
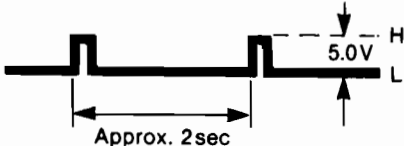
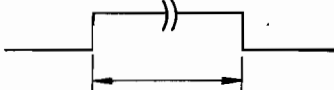


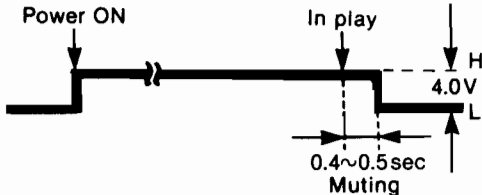
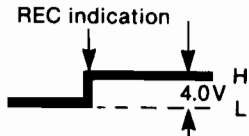
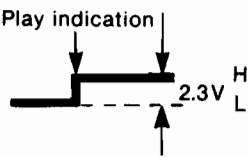
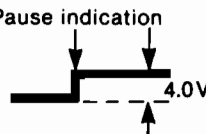
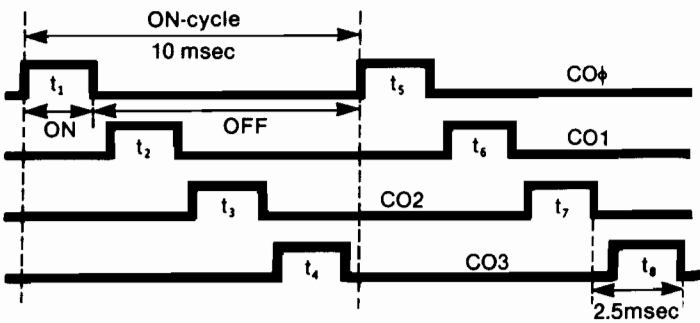
Fig. 20

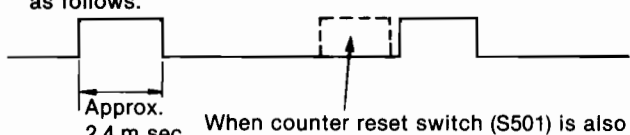
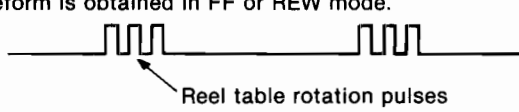
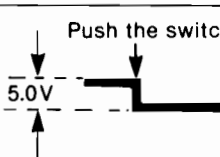
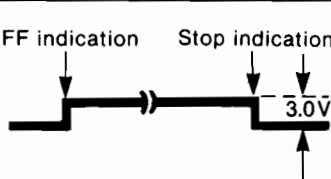
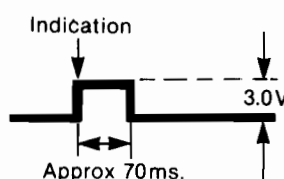
MN1405RH (IC501) EACH TERMINAL FUNCTION AND WAVEFORM

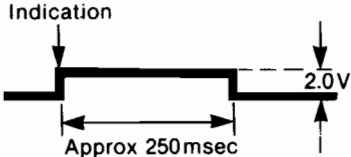
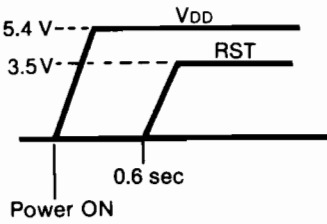
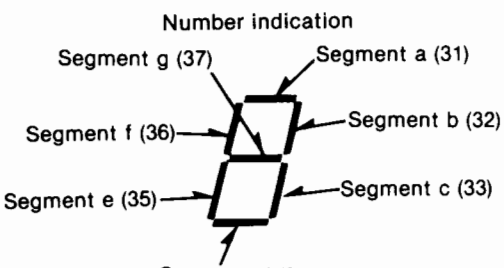
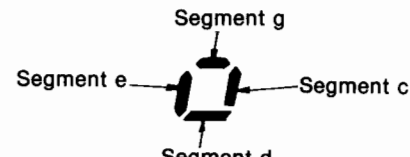
(BOTTOM VIEW)

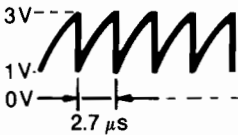


Terminal No.	Symbol	Name	Function/operation
1.	VSS	GND	
2.	C011	TIMER REC-PLAY Signal output	 Approx 200μs Becomes "H" level only when power is supplied.
3.	C010	FL meter reset	 Approx. 2sec 5.0V H L This output is for resetting the Peak Hold of the FL Meter. The pulse 2.5msec. width is transmitted in approx. 2-second cycles, regardless of the mechanism operation.
4.	C09	TIME OUT	Not used.  Time indication Becomes "H" level only during time indication
5.	C08	No connection	Not used.

Terminal No.	Symbol	Name	Function/operation
6.	C $\bar{O}$ 7	Muting	 "L" level 0.4 to 0.5 second after "PLAY" finish. "H" level in PAUSE, FF, REW STOP. "L" level approx. 0.4 second after "REC PAUSE" is switched to REC. "L" level approx. 0.4 second after command in case PAUSE mode is set to REC command.
7.	C $\bar{O}$ 6	REC indication	 "H" level simultaneously with REC indication. "H" level immediately after power is ON in TIMER REC mode. "H" level held if in TIMER REC position, when STOP AUTO RESET mechanism operates.
8.	C $\bar{O}$ 5	PLAY indication	 "H" level simultaneously with PLAY indication. Same as the above for TIMER PLAY.
9.	C $\bar{O}$ 4	PAUSE indication	 "H" level simultaneously with PAUSE indication.
10.	C $\bar{O}$ 3	FL grid & input SW. scan	
11.	C $\bar{O}$ 2	FL grid & input SW. scan	
12.	C $\bar{O}$ 1	FL grid & input SW. scan	
13.	C $\bar{O}$ φ	FL grid & input SW. scan	

Terminal No.	Symbol	Name	Function/operation
14.	A13	Input switch state reading	Reads switch states corresponding to scanning of CO ϕ — 3 (when the cassette half detection leaf switch (S605) is ON, this terminal is connected to the HALL IC, MUSIC SELECT switch (S512) and SET switch (S511)).
15.	A12	Input switch state reading	Reads switch states corresponding to scanning of CO ϕ — 3 (when the mode leaf switch (S602) is ON, this terminal is connected to the accidental erasing protection leaf switch (S601), memory repeat switch (S509), TAPE/TIME switch (S510) and TIMER PLAY switch (S513)).
16.	A11	Input switch state reading	Reads switch states corresponding to scanning of CO ϕ — 3 (when the play leaf switch (S604) is ON, this terminal is connected to the REC MUTE switch (S508)).
17.	A1 ϕ	Input switch state reading	Reads switch states corresponding to scanning of CO ϕ — 3 (when the stop leaf switch (S603) is ON, this terminal is connected to the counter reset switch (S501)).
			Operation example Counter reset switch (S501) and stop switch (S603) are connected to A10. If only S603 is closed, the waveform is as follows:  When counter reset switch (S501) is also closed: Cassette half detection switch (S605), HALL IC output, MUSIC SELECT switch (S512) and SET switch (S511) are connected to A13. If all switches are OFF, the following waveform is obtained in FF or REW mode. 
18.	Bi3	REW key	Push the switch.  "H" in the normal case, "L" when the switch is pushed.
19.	Bi2	FF key	
20.	Bi1	PLAY key	
21.	Bi ϕ	STOP key	
22.	EO ϕ	Brake plunger	FF indication Stop indication  "H" during FF/REW operations.
23.	EO1	Trigger plunger	Indication  "H" until MODE SW is closed after the input to switch the mechanism, such as PLAY, PAUSE, STOP, etc. has been applied. (Approx. 70ms. depending on the mechanism condition.)

Terminal No.	Symbol	Name	Function/operation
24.	E $\bar{O}2$	Motor CL	Indication  Approx 250msec "H" until MODE SW is changed from "close" to "open" following the indication that the mechanism mode has been changed. REW indication  "H" in REW operation.
25.	E $\bar{O}3$	Motor UNCL	Same as the above in MODE conversion. "H" during FF (Cue).
26.	TST	Chip test	Connected to GND.
27.	RST	RESET	Computer's RESET terminal. Reset is less than 0.8V.  Power ON
28.	CSLCT	CSLCT	Connected to GND.
29.	SNS ϕ	Input switch state reading	Reads switch states corresponding to scanning of CO ϕ — 3. (This terminal is connected to REC switch (S503), PAUSE switch (S502), switch detecting pulses between signal portions and TIMER REC switch (S513).
30.	SNS1	Reference signal reading	Time caount reference signal: approx. 1446 Hz
31.	D $\bar{O}\phi$	FL counter Segment a	Number indication  Segment g (37) Segment a (31) Segment f (36) Segment b (32) Segment e (35) Segment c (33) Segment d (34) Running indication  Segment g Segment e Segment c Segment d 5V ON 0V OFF Counter number changes when takeup reel table rotates two turns. Each segment of running indication changes when the reel table rotates a half turn. Waveforms change since dynamic lighting is used.
32.	D $\bar{O}1$	FL counter Segment b	
33.	D $\bar{O}2$	FL counter Segment c	
34.	D $\bar{O}3$	FL counter Segment d	
35.	D $\bar{O}4$	FL counter Segment e	
36.	D $\bar{O}5$	FL counter Segment f	
37.	D $\bar{O}6$	FL counter Segment g	

Terminal No.	Symbol	Name	Function/operation
38.	DO7	No connection	Not used.
39.	VDD	Power source	Operated at 4.5V to 6.0V.
40.	OSC	Oscillation terminal	 Oscillation is approx. 370 kHz. Because the connection of a probe affects the terminal, nothing should be connected to this terminal for any other measurements. Use COφ to 3 in measuring the computer's velocity; Approx. 100 Hz in STOP condition.

TROUBLESHOOTING OF MAIN CONTROL CIRCUIT

Fault	Probable cause	Microcomputer terminal to check	Relevant mechanism parts	Relevant external parts
Mechanism dose not operate at all.				
FL not lighting	Microcomputer not operating			
	Power not supplied.	39 (VDD)		
	Clock not oscillating.	40 (OSC 10 to 13		C503, C504 VR501 to R514
	Reset locked.	27 (RST)		C511, C506, Q506, Q401, R513, R512
	Microcomputer normal. (Scan normal)			
	Connection to FL Driver.	10 to 13 31 to 37		
FL lighting OK. (MODE LED not lighting.)	Half SW. closed.	14 (Ai3)	Half SW.	D502
MODE indicator lighting OK.	Motor circuit faulty.	24, 25	Motor connection	IC502

Fault	Probable cause	Microcomputer terminal to check	Relevant mechanism parts	Relevant external parts
Mechanism defective.				
FF/REW reverse rotation.	Reverse connection of motor.	24, 25	Motor connection	IC502
FF/REW motor rotating, reel not rotating.	Brake plunger not being with drawn.	22 (EO ϕ)	Brake plunger disconnection, etc.	IC502
CAM continuous rotation in PLAY.	MODE SW. defective.	15 (Ai2)	MODE SW.	D505, D501
Motor rotating in PLAY, but CAM's not switched.	Trigger plunger not operating	23 (EO1)	Trigger plunger	IC502
Motor rotates in reverse and does not stop after switching to PLAY or PAUSE.	PLAY or STOP SW, defective.	16 (Ai1) 17 (Ai ϕ)	STOP PLAY Leaf SW.	D504, Q502 D503, D511
REC IND. does not light up. (Operation is normal)	LED or drive transistor defective.	7 (CO6)		IC502
PLAY IND. does not light up.	- do -	8 (CO5)		IC502
PAUSE IND. does not light up.	- do -	9 (CO4)		IC502
Not counting.	Hall IC faulty, buffer circuit faulty.	14 (Ai3)	Reel magnet	IC503 (Hall IC) Q501, D502
AUTO STOP functioning soon after operation begins.	Same as the above. (Not counting)			
No muting.	Muting output connection etc.	6 (CO7)		
No peak-resetting.	Connection	3 (CO10)		Q301
Accidental erase prevention mechanism not functioning.	Leaf SW	15 (Ai2)	Accidental erasure Leaf SW	D501, 505
Operating during EJECT.	Half detection SW.	14 (Ai3)	Half detection SW.	D502

OUTLINE OF dbx SYSTEM

In 1971, the dbx company of Massachusetts, U.S.A., succeeded in developing a logarithmic compression/expansion system for audio signals which extends across an extremely wide amplitude range and results in a very low distortion rate.

In this system, the dynamic range of the input signal is compressed to 1/2 its original level (measured in decibels), and then recorded. The recorded signal is then expanded (2x) prior to playback, in order to restore it to the original level. By this process, a dynamic range exceeding 100dB can be easily obtained by using an ordinary tape recorder.

This system is referred to as a decilinear noise reduction system, but is generally called the "dbx system", the name being derived from the dbx company.

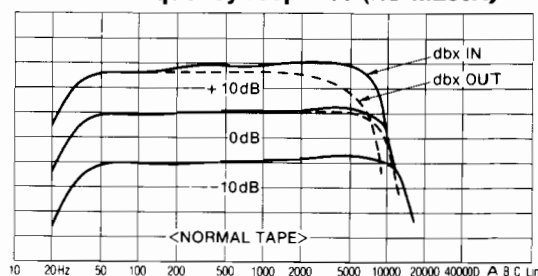
• The features of the dbx system

1. A significant noise reduction (approximately 30dB or more) is obtained over the entire audible frequency range.

Noise reduction mode	S/N ratio RS-M255X	Remarks
Noise reduction "OUT"	58dB	CrO ₂ tape, peak level
Dolby NR "IN"	66dB	CrO ₂ tape, peak level
dbx "IN"	92dB	CrO ₂ tape, peak level

2. A great improvement in the dynamic range makes it possible to extend the range to 110dB (at 1kHz, CrO₂ tape).
3. The direct logarithmic method of compression and expansion protects against problems caused by level mismatching.
4. Even if phase distortion occurs in the signal transmission system, precise operation is maintained by means of the RMS level detector.
5. A low distortion rate is maintained throughout the frequency range.
 - Improvement of high frequency response. The dbx system solves the problem of deteriorated high frequency at higher input levels which is an inherent fault of cassette tape equipment. The response at approx. 8,000Hz at 10dB input is improved as much as 14dB. As a result, flatter response is obtained at both low and high input levels.

Overall frequency response (RS-M255X)

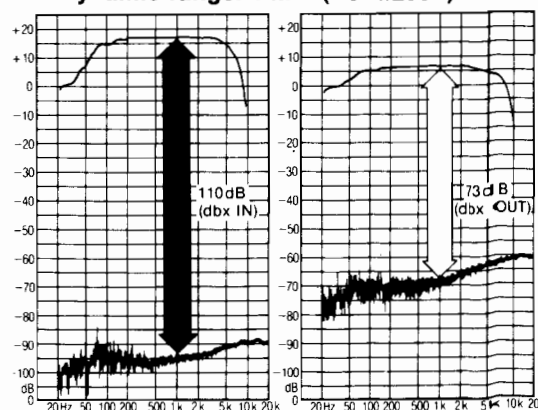


• Remarkable dynamic range of 110dB

About dynamic range:

The dynamic range refers to the output range of an audio transmission system, extending from the lowest recognizable level to the highest possible level produced. Dynamic range is one of the values used to express the degree of fidelity of an audio transmission system.

Dynamic range: 1 kHz (RS-M255X)



- **Compressing the dynamic range to 1/2 before recording, and then expanding it (by 2x) before playback produces the remarkable dynamic range of the dbx system.**

- The dynamic range of cassette tape with a saturation level of +10dB and a noise level of -45dB (such as Technics CrO₂ position tape) is 55dB. Any sounds with a level greater than +10dB will result in considerable distortion, and any sounds less than -45dB will be inaudible due to the effect of noise, making high-fidelity reproduction impossible.

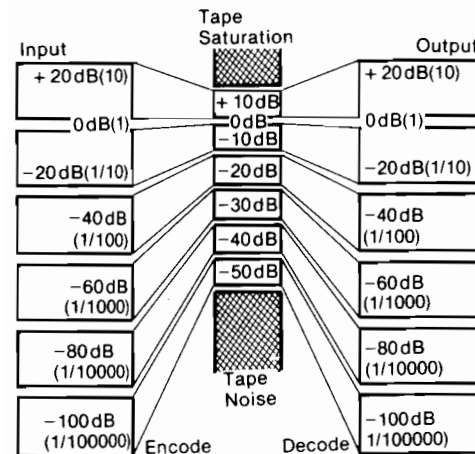
The dbx system, however, linearly compresses the input level by a ratio of 1/2 in decibels prior to recording it onto the tape. A +20dB sound is thus compressed to +10dB, a -20dB sound is compressed to -10dB, and a -90dB sound is compressed to -45dB.

As a result, a signal with a dynamic range extending from -90dB to +20dB (a 110dB dynamic range) can be contained within a range which extends from -45dB to +10dB (a 55dB dynamic range). Recording onto a cassette tape with a 55dB dynamic range is then possible.

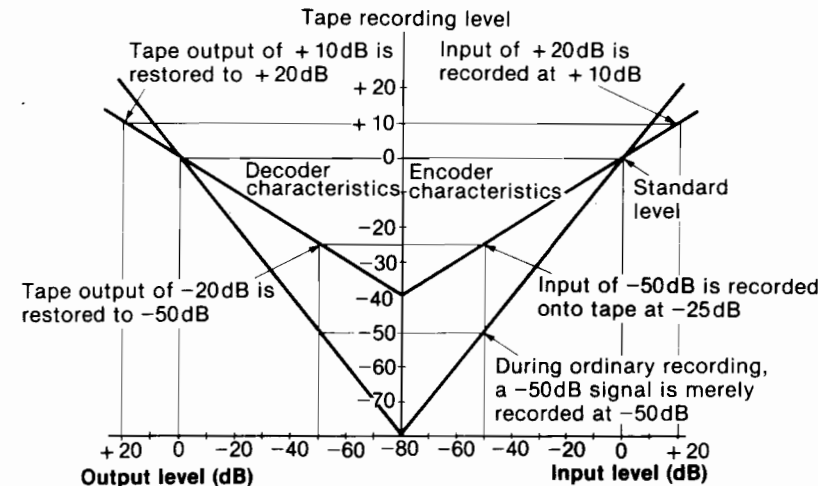
Prior to playback, the exact opposite process occurs and the sound levels are expanded. The +10dB sound is restored to its original level of +20dB, the -10dB sound is restored to -20dB, and the -45dB sound is restored to -90dB.

Therefore, the basic principle of the dbx system, as described above, is to compress the 110dB dynamic range by 1/2 to 55dB prior to recording, and then the expand it (by 2x) prior to playback.

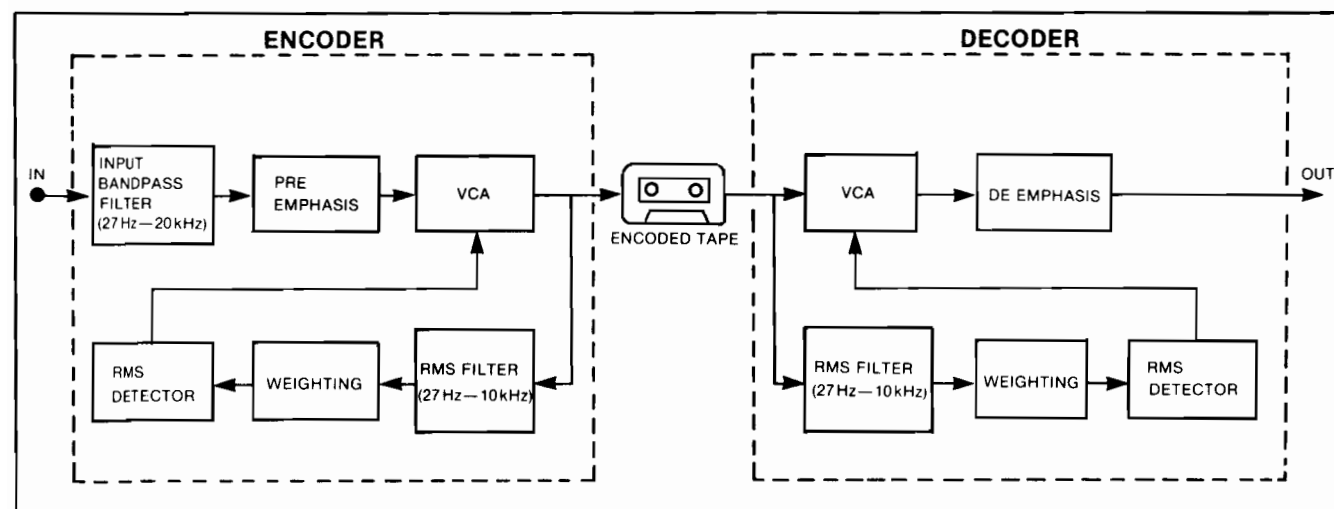
dbx system function diagram



Level compression/expansion diagram



THE BLOCK DIAGRAM OF dbx SYSTEM



(Block configuration change for dbx circuit Encode/Decode is electrically performed by switching transistors between blocks.)

ENCODER

- The portion of the dbx system which compresses the volume level of the input signal by 1/2 (measured in decibels), before sending it to the recording system, is called the encoder.

① INPUT BANDPASS FILTER (27 Hz—20 kHz)

To prevent pulse noise or other types of interference from causing erroneous operation of the dbx system, all signals outside the 27Hz—20kHz audio band range are eliminated here.

② PRE-EMPHASIS

The high frequency range, where hiss noise is prominent, is emphasized here during recording. The end result is that, although the dbx system is effective in reducing noise across entire frequency band, noise in the high frequency range is reduced still more by this pre-emphasis circuitry.

③ VCA (voltage-controlled amplifier/attenuator)

This is an extremely important circuitry in the construction of the dbx system. In response to the incoming DC control voltage, the VCA varies the degree of amplification logarithmically in the same manner as the direct current, resulting in compression and expansion of the input signal's dynamic range.

④ RMS DETECTOR (RMS: root mean square)

This is an important element in the composition of the dbx system, because its circuitry generates a DC voltage (the voltage that controls the degree of amplification in the VCA) in proportion to the size of the input signal.

It does this by detecting the root mean square value of the input signal, and then converting it to a DC voltage in proportion to the logarithm of the detected level.

Erroneous operation due to phase shift is prevented by monitoring of the voltage level derived from the root mean square value.

⑤ WEIGHTING

To prevent the saturation level of the tape deck in high frequencies, this increases the RMS DETECTOR high frequency sensitivity and decreases the VCA high frequency gain. As a result, the linearity of the tape deck is enhanced in the high frequency range.

⑥ RMS FILTER (27 Hz to 10 kHz)

This filter cuts any signal other than 27 Hz to 10 kHz that mixes in input signals to prevent the RMS DETECTOR from malfunctioning. Those to be cut include an FM tuner STEREO PILOT signal, tape deck bias leakage and record player motor rotational noise. In addition, the signal in the frequency range (27 Hz to 10 kHz) passing through the BAND PASS FILTER is comparatively small in level variations when handled by the tape deck.

This ensures correct complementarity in the operation of the RMS DETECTOR and VCA during Encoding and Decoding.

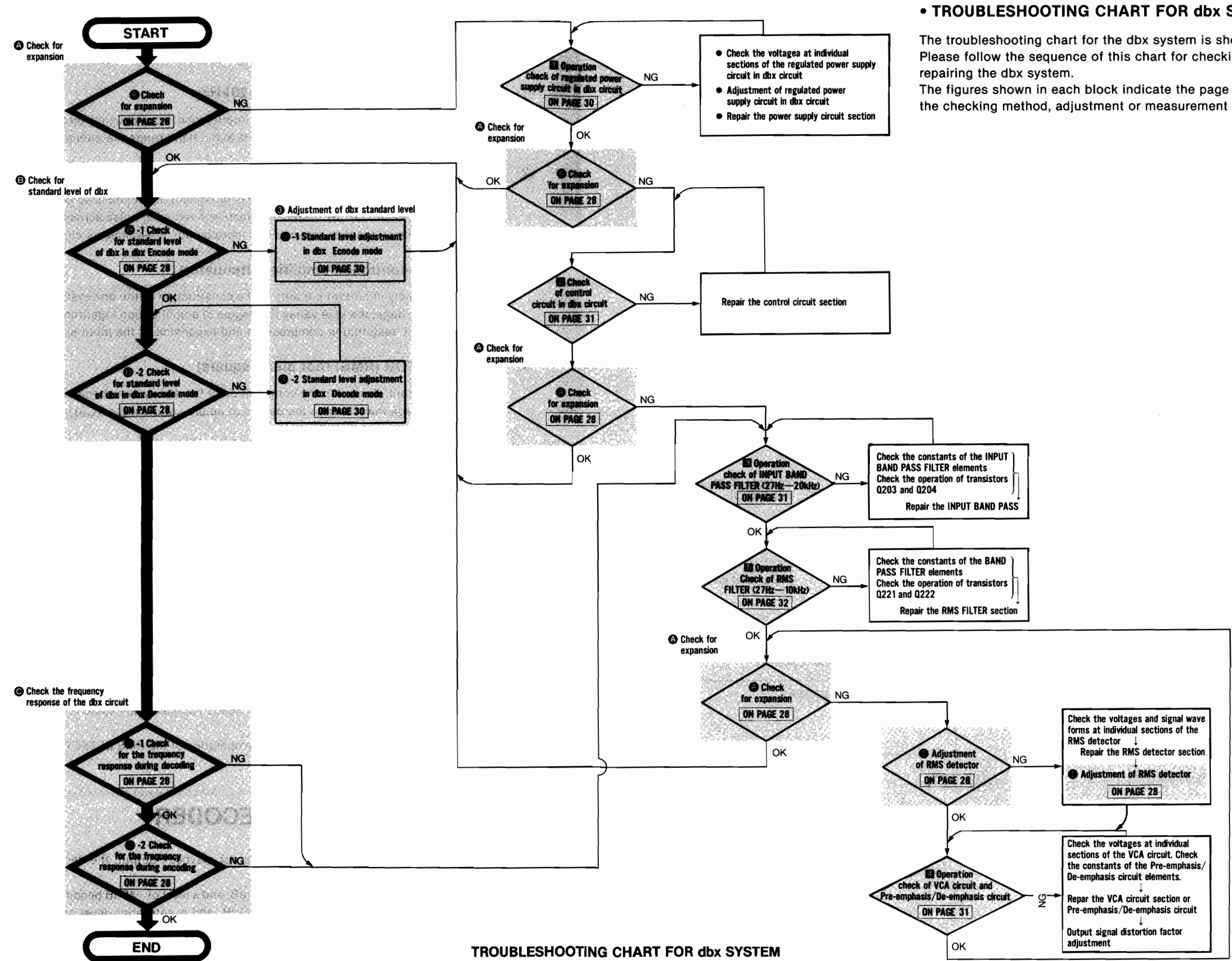
DECODER

As shown in the diagram on the previous page, for playback output, the decoder expands the constantly changing level to double the decibel range.

For example, a -30dB signal is expanded to -60dB, and a level of -45dB becomes -90dB. On the other hand, a playback output +10dB is expanded to +20dB, and a saturation level signal is also correspondingly increased.

In terms of the system's operation, the decoder's function is the exact opposite of the function of the previously mentioned encoder.

MEASUREMENT AND ADJUSTMENT METHODS (FOR dbx SYSTEM)



TROUBLESHOOTING CHART FOR dbx SYSTEM

Fig. 1

• ADJUSTMENT PARTS LOCATION OF dbx SYSTEM

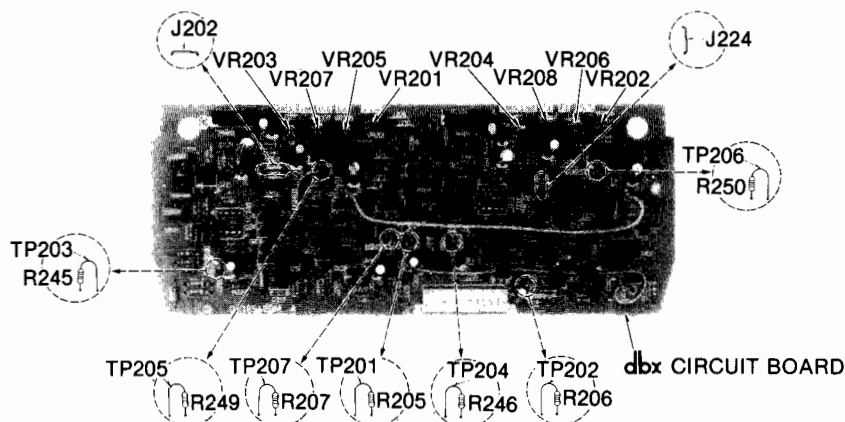


Fig. 2

BLOCK DIAGRAM OF dbx SECTION (L-CH ONLY)

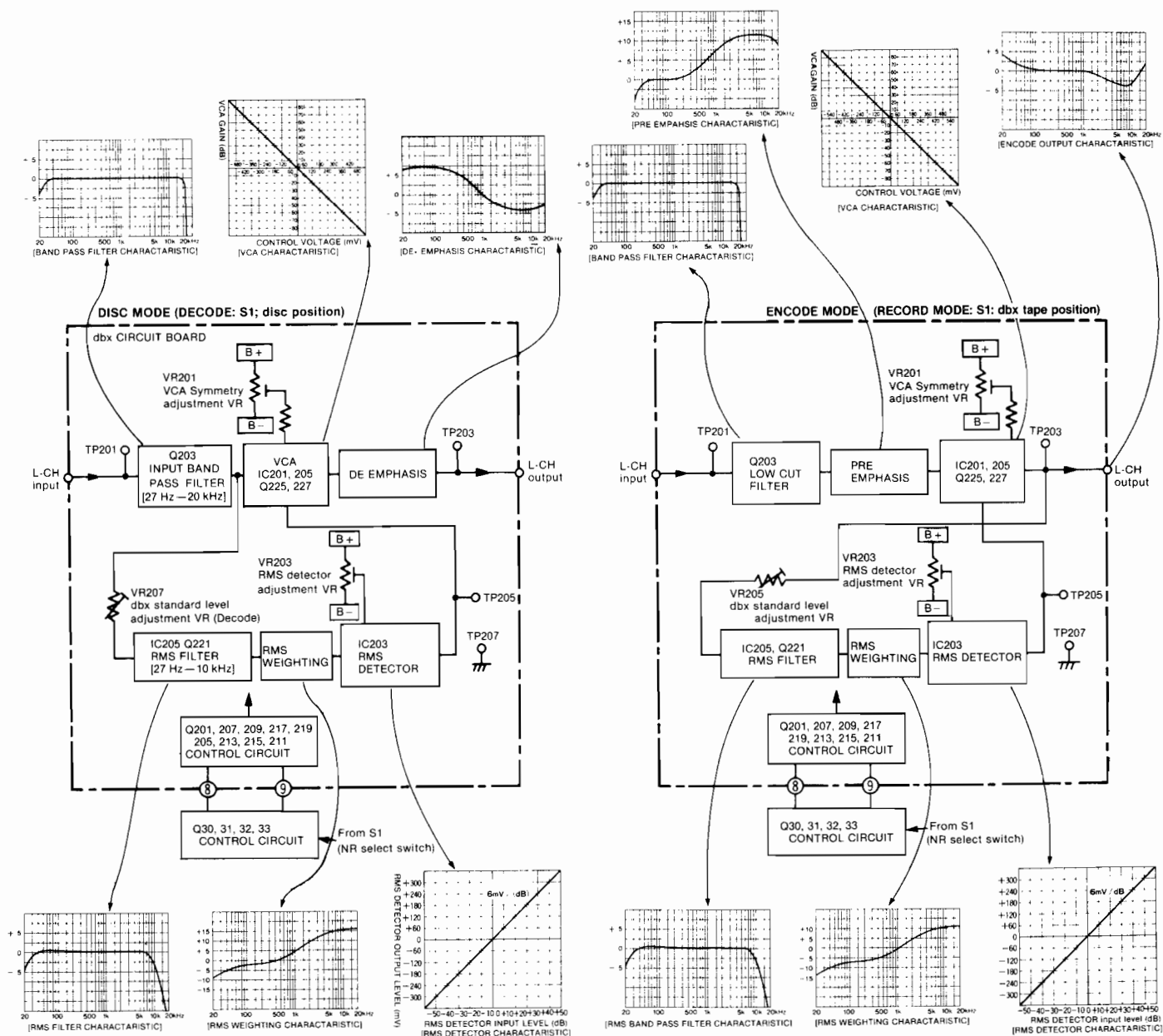


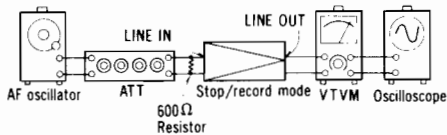
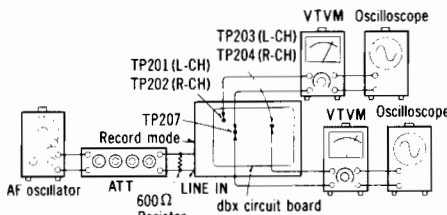
Fig. 3

Note: Encode/decode selection of the dbx circuit in RS-M255X is done with a control circuit, composed of transistors. (This control circuit is interlocked with S1 (NR selection switch).)

dbx SYSTEM CHECKING METHOD

NOTES: Keep good condition, set switches and controls in the following positions, unless otherwise specified.

- Input level controls: Maximum
- Output level control: Maximum

ITEM	CHECKING METHOD																		
A Check for expansion Condition: • Stop mode • Input level controls ... MAX • Output level control ... MAX • Noise reduction selector ... disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	A Check for expansion 1. Make the connections as shown in fig. 4 and apply 1 kHz - 27 dB signal from LINE IN, and set the noise reduction selector to disc position. 2. Adjust ATT, increase input signal level by 10 dB, and make sure that the reading for VTVM increases by 20 dB $\pm$ 1 dB. 3. Adjust ATT, decrease the input signal level, and make sure that the reading for VTVM decreases by 20 dB $\pm$ 1 dB.  Fig. 4																		
B Check for standard level of dbx Condition: • Stop/record mode • Input level controls ... MAX • Noise reduction selector ... disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	B-1 Check for standard level of dbx in dbx Encode mode 1. Make the connections as shown in fig. 5 and apply 1 kHz - 27 dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set the unit to record mode, adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) is 300 mV. 3. Make sure that the signal level at TP203 (L-CH) and TP204 (R-CH) is 300 mV $\pm$ 0.5 dB  Fig. 5 B-2 Check for standard level of dbx in dbx Decode mode 1. Make the connections as shown in fig. 5 and apply 1 kHz - 27 dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to disc position and adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) becomes 300 mV. 3. Make sure that the signal level at TP203 (L-CH) and TP204 (R-CH) is 300 mV $\pm$ 0.5 dB.																		
C Check the frequency response of the dbx circuit Condition: • Stop/record mode • Input level controls ... MAX • Noise reduction selector ... disc/dbx tape Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600Ω)	C-1 Check the frequency response during decoding 1. Make the connections as shown in fig. 5 and apply 1 kHz - 27 dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to disc position, and adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) becomes 300 mV. 3. With the signal level at TP203 (L-CH) and TP204 (R-CH) as 0 dB, change the signal frequency to 100 Hz, 20 Hz and 7 kHz respectively. Read signal levels at TP203 (L-CH) and TP204 (R-CH) and check that they are within the specifications-1 <table border="1"> <caption>Specifications-1</caption> <thead> <tr> <th>Frequency</th><th>Signal levels at TP203 and TP204</th></tr> </thead> <tbody> <tr> <td>1 kHz</td><td>0 dB (300 mV)</td></tr> <tr> <td>100 Hz</td><td>- 0.5 dB $\pm$ 1 dB</td></tr> <tr> <td>20 Hz</td><td>- 30 dB $\pm$ 5 dB</td></tr> <tr> <td>7 kHz</td><td>+ 7 dB $\pm$ 1 dB</td></tr> </tbody> </table> C-2 Check the frequency response during encoding 1. Make the connections as shown in fig. 5 and apply 1 kHz - 27 dB signal from LINE IN, and check as follows: 2. Set the noise reduction selector to dbx tape position, and the unit to record mode. 3. Adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) is 300 mV. 4. With the signal level at TP203 (L-CH) and TP204 (R-CH) as 0 dB, change the signal frequency to 100 Hz and 7 kHz respectively. Read signal levels at TP203 (L-CH) and TP204 (R-CH) and check that they are within the specifications-2. <table border="1"> <caption>Specifications-2</caption> <thead> <tr> <th>Frequency</th><th>Signal levels at TP203 and TP204</th></tr> </thead> <tbody> <tr> <td>1 kHz</td><td>0 dB (300 mV)</td></tr> <tr> <td>100 Hz</td><td>+ 0.5 dB $\pm$ 1 dB</td></tr> <tr> <td>7 kHz</td><td>- 3.5 dB $\pm$ 1 dB</td></tr> </tbody> </table>	Frequency	Signal levels at TP203 and TP204	1 kHz	0 dB (300 mV)	100 Hz	- 0.5 dB $\pm$ 1 dB	20 Hz	- 30 dB $\pm$ 5 dB	7 kHz	+ 7 dB $\pm$ 1 dB	Frequency	Signal levels at TP203 and TP204	1 kHz	0 dB (300 mV)	100 Hz	+ 0.5 dB $\pm$ 1 dB	7 kHz	- 3.5 dB $\pm$ 1 dB
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7 kHz	- 3.5 dB $\pm$ 1 dB																		
NOTES: • If the results of the above checks A, B and C do not satisfy the specifications, perform the following adjustments. • If the specifications are not satisfied even after the adjustments, follow the checking procedure for problems. • If the output signal is not produced or is extremely distorted, follow the checking procedure for problems.																			

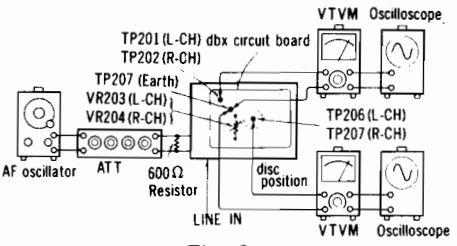
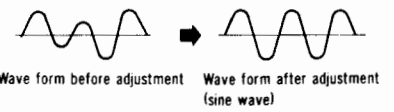
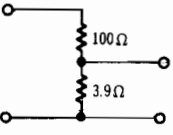
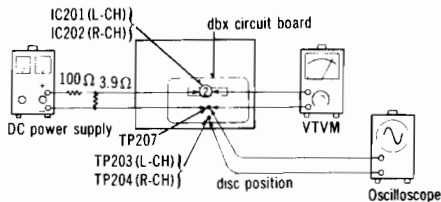
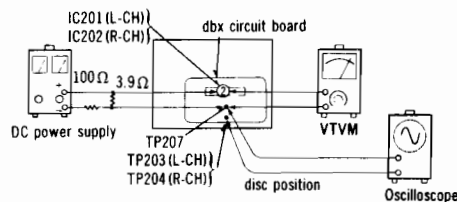
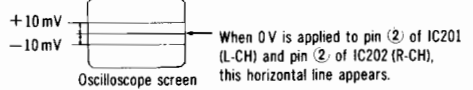
ADJUSTMENT OF dbx SYSTEM

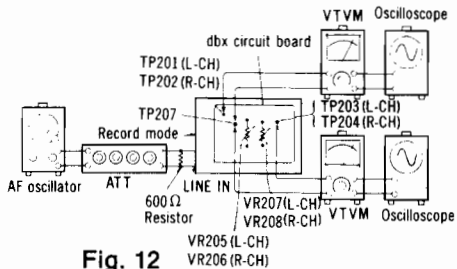
NOTES: When adjusting the circuit of the dbx system, be sure to perform the adjustments in the following order:

- ① Adjustment of RMS detector. ② Adjustment of VCA. ③ Adjustment of dbx standard level.

Keep good condition, set switches and controls in the following positions, unless otherwise specified.

- Input level controls: Maximum

ITEM	ADJUSTMENT
① Adjustment of RMS detector Condition: • Stop mode • Input level controls ... MAX • Noise reduction selector ... disc Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600 Ω)	1. Make the connections as shown in fig. 6, and set the noise reduction selector to disc position. 2. Apply 100Hz -27dB signal from LINE IN. 3. Adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) becomes 300mV. 4. Make sure that the output signal at TP205 (L-CH) and TP206 (R-CH) is at 200Hz sine wave. If the output signal is not sinusoidal as shown in fig. 7, adjust VR203 (L-CH) and VR204 (R-CH) to make it sinusoidal. NOTE: The voltage of the output signal after adjustment is about 0.5mV rms.  Fig. 6  Fig. 7
② Adjustment of VCA Condition: • Record /stop mode • Input level controls ... MAX • Noise reduction selector ... disc/dbx tape Equipment: • VTVM • Oscilloscope • Resistor (100 Ω, 3.9 Ω)	Preparation before adjustment 1. Before adjusting VCA, from the device shown below using resistors of 100 Ω and 3.9 Ω (See fig. 8) 2. Set NR switch to dbx disc. Remove jumpers [J202 (L-CH) and J224 (R-CH)]. 3. Arrange connections referring to wire connection diagram (fig. 9 and 10), since 0V, +180mV and -180mV (DC) are applied in this order to pin 2 of IC201 (L-CH) and pin 2 of IC202 (R-CH)  Fig. 8  Fig. 9 Connections when applying +180mV and 0V Adjust DC power supply and arrange connections so that +180mV or 0V can be applied to TP203 (L-CH) and TP204 (R-CH)  Fig. 10 Connections when applying -180mV Adjust DC power supply and arrange connections so that -180mV can be applied to TP203 (L-CH) and TP204 (R-CH). Adjustment procedure 1. Apply 0V to pin ② of IC201 (L-CH) and pin ② of IC202 (R-CH), and a horizontal line will appear on the screen of the oscilloscope. Use this line as the reference line. 2. Apply +180mV to pin ② of IC201 (L-CH) and pin ② of IC202 (R-CH) (See fig. 9), and check that the level is not more than 10mV from the reference line. If improper, adjust VR201 (L-CH) and VR202 (R-CH). 3. In the same way, apply -180mV to pin ② of IC201 (L-CH) and pin ② of IC203 (R-CH) (See fig. 10), and check that the level is not more than 10mV from the reference line. If improper, adjust VR201 (L-CH) and VR202 (R-CH). 4. Repeat steps 2 and 3, and adjust VRs so that the levels are within ± 10mV when +180mV and -180mV are applied (fig. 11). 5. After adjustment, connect jumpers J202 (L-CH) and J224 (R-CH) (See fig. 2).  Fig. 11
③ Adjustment of dbx standard level Condition: • Record /stop mode • Input level controls ... MAX	NOTE: Be sure to perform the standard level adjustment in dbx Encode, followed by the standard level adjustment in dbx Decode.

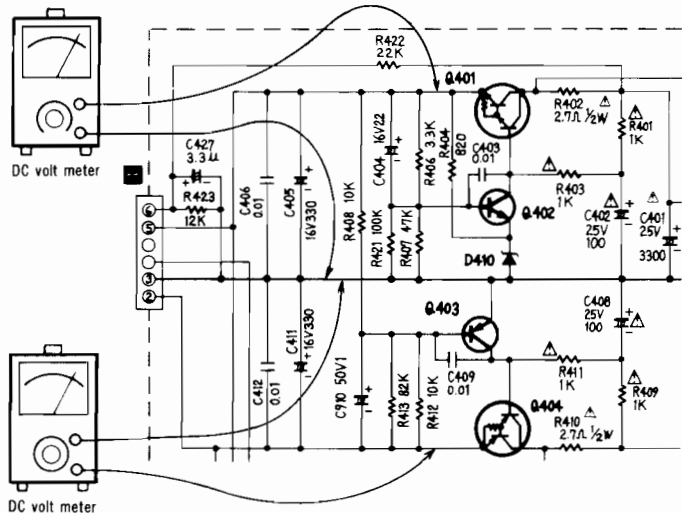
ITEM	ADJUSTMENT
- Noise reduction selector ... disc/dbx tape Equipment: - VTVM - AF oscillator - ATT - Oscilloscope - Resistor (600 Ω)	③-1 Standard level adjustment in dbx Encode mode - Make the connection as shown in fig. 12 and apply 1 kHz -27 dB signal from LINE IN, and set the noise reduction selector to dbx tape position. - Set unit to record mode, adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) is 300 mV. - Adjust VR205 (L-CH) and VR206 (R-CH) so that the output signal level at TP203 (L-CH) and TP204 (R-CH) becomes 300 mV $\pm$ 0.5 dB. ③-2 Standard level adjustment in dbx Decode mode - Make the connection as shown in fig. 12 and apply 1 kHz -27 dB signal from LINE IN, and perform the following adjustments. - Set the noise reduction selector to disc position, and adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) becomes 300 mV. - Adjust VR207 (L-CH) and VR208 (R-CH) so that the output signal level at TP203 (L-CH) and TP204 (R-CH) becomes 300 mV $\pm$ 0.5 dB. Fig. 12 
NOTES: - After adjustments ①, ② and ③, re-check according to "dbx SYSTEM CHECKING METHOD". - If the specifications are not satisfied, perform the adjustments again.	

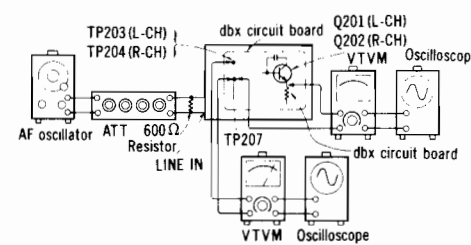
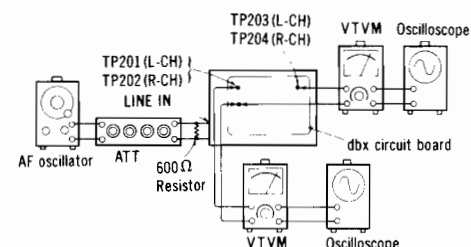
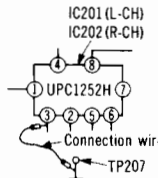
CHECKING PROCEDURE FOR PROBLEMS

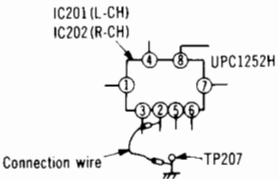
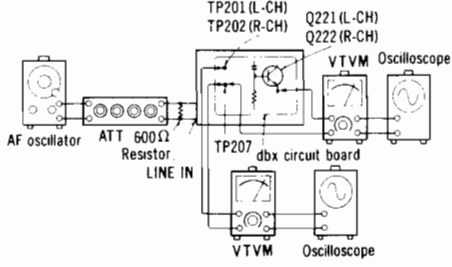
NOTES: Find defective parts according to the circuit operation checking method given below, and use the results for your reference during repair. Remember to adjust after repair.

Keep good condition, set switches and controls in the following positions, unless otherwise specified.

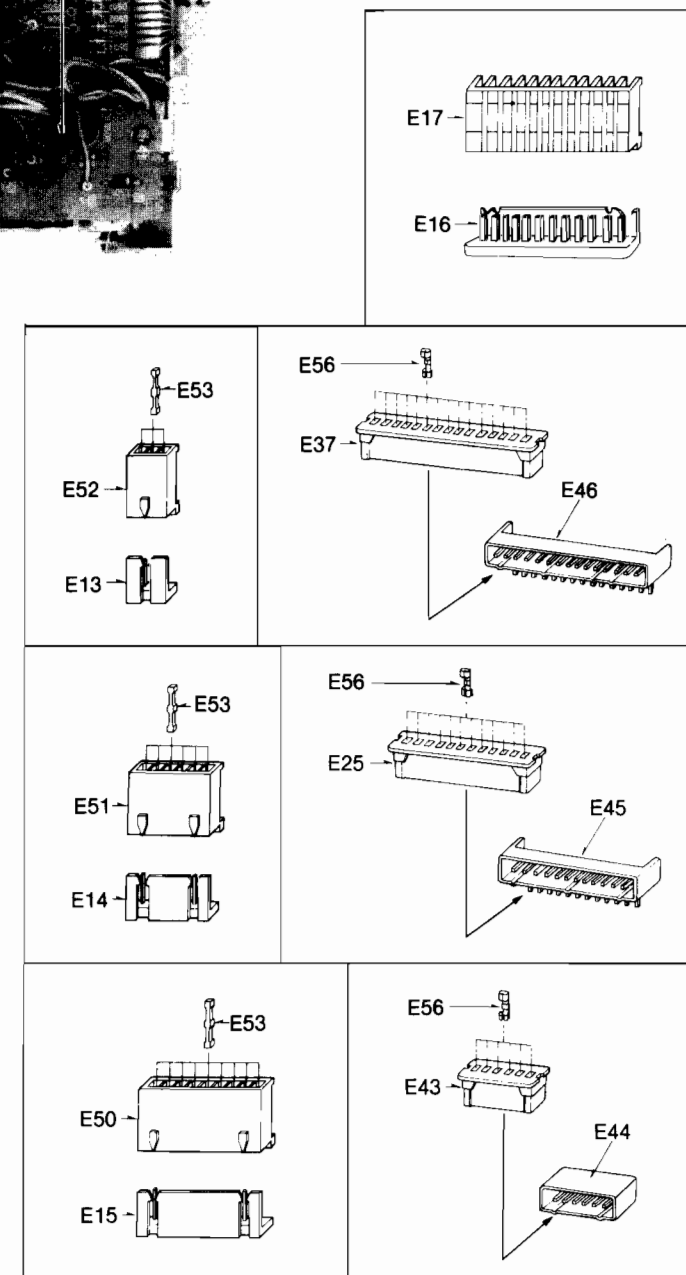
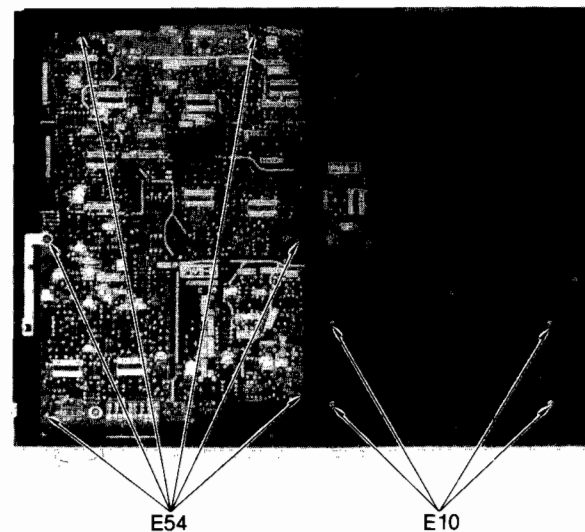
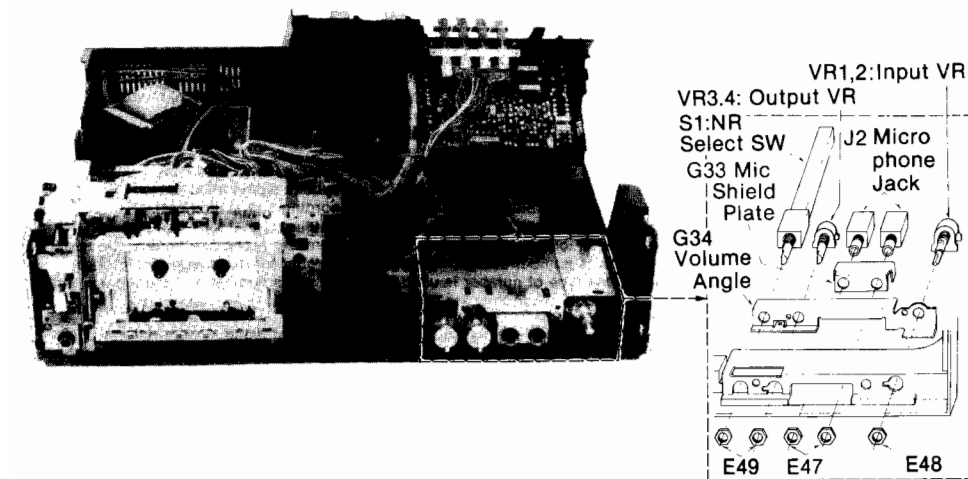
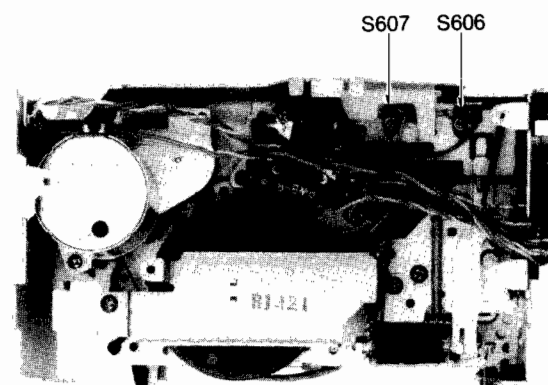
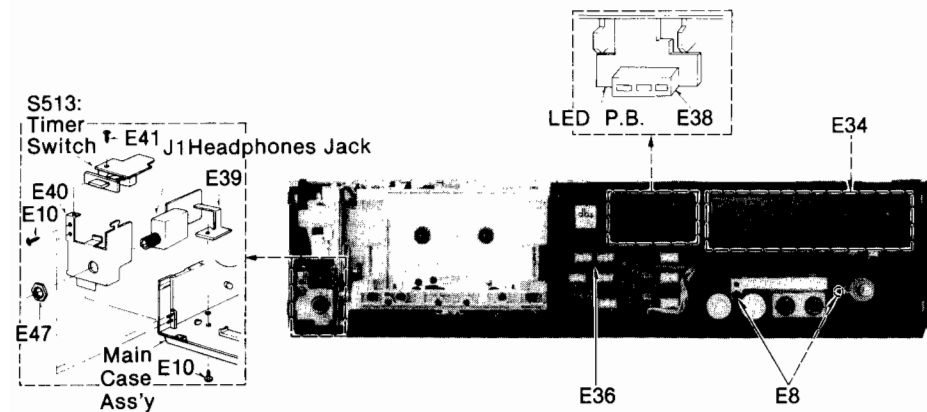
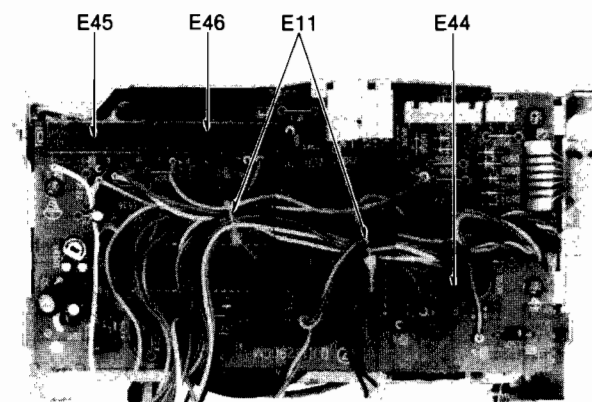
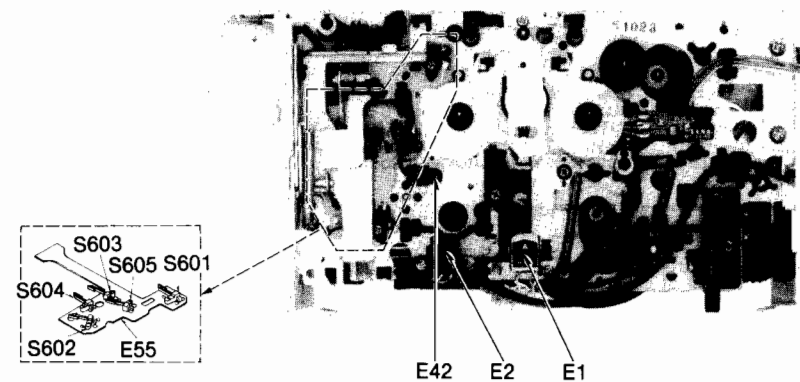
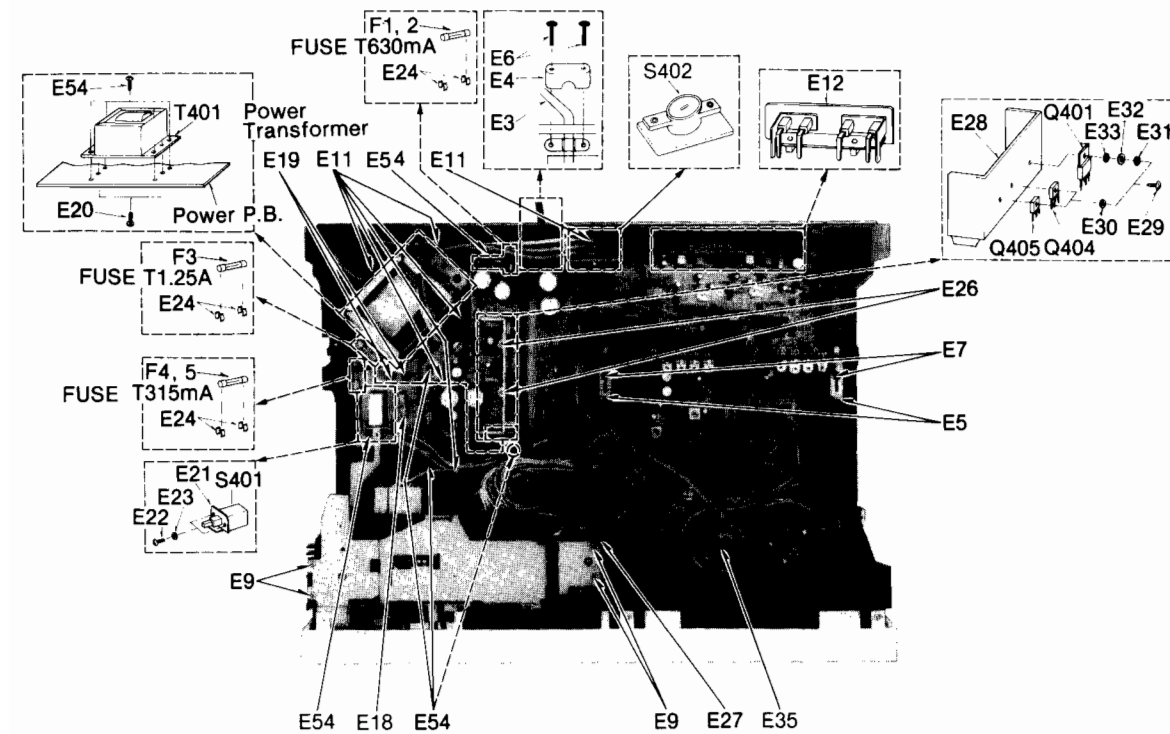
- Input level controls: Maximum

ITEM	CHECKING METHOD
① Operation check of regulated power supply circuit in dbx circuit Equipment: - DC volt meter - Oscilloscope	①-1 Check of +10.5V voltage Make the connection as shown in fig. 13 and make sure that the emitter voltage of Q401 is around +10.5V. ①-2 Check of -10.5V voltage Make the connection as shown in fig. 13 and make sure that the emitter voltage of Q404 is around -10.5V. Fig. 13 

ITEM	CHECKING METHOD																																																																																																																																																																																													
2 Check of control circuit in dbx circuit Equipment: DC volt meter	E.C.B (G.S.D) voltage check of each switching transistor for Encode/Decode The terminal voltage of each switching transistor in Encode/Decode mode are shown in the table below. <table><tr><th rowspan="2">Transistor Ref. No.</th><th colspan="3">Encode (dbx tape)</th><th colspan="3">Decode (dbx tape)</th><th colspan="3">disc</th></tr><tr><th>E (G)</th><th>C (S)</th><th>B (D)</th><th>E (G)</th><th>C (S)</th><th>B (D)</th><th>E (G)</th><th>C (S)</th><th>B (D)</th></tr><tr><td>Q30</td><td>0V</td><td>0.015V</td><td>0.62V</td><td>-0.001V</td><td>1.168V</td><td>0.017V</td><td>0V</td><td>0.58V</td><td>0.018V</td></tr><tr><td>Q31</td><td>0V</td><td>10.66V</td><td>-0.001V</td><td>-0.001V</td><td>0.006V</td><td>0.65V</td><td>-0.001V</td><td>0.006V</td><td>0.65V</td></tr><tr><td>Q32</td><td>10.78V</td><td>-10.62V</td><td>10.72V</td><td>10.77V</td><td>10.75V</td><td>10.1V</td><td>10.78V</td><td>10.74V</td><td>10.1V</td></tr><tr><td>Q33</td><td>-10.72V</td><td>5.97V</td><td>-10.67V</td><td>-10.72V</td><td>-10.70V</td><td>-10.04V</td><td>-10.73V</td><td>-10.70V</td><td>-10.04V</td></tr><tr><td>Q3</td><td>0.074V</td><td>-0.029V</td><td>0V</td><td>1.69V</td><td>1.64V</td><td>0.99V</td><td>0.055V</td><td>-0.035V</td><td>0V</td></tr><tr><td>Q11, 12</td><td>-10.8V</td><td>0V</td><td>0V</td><td>0.65V</td><td>0.04V</td><td>0.04V</td><td>0.65V</td><td>0.04V</td><td>0.04V</td></tr><tr><td>Q13, 14</td><td>0.58V</td><td>0V</td><td>0V</td><td>-10.8V</td><td>0.04V</td><td>0V</td><td>-10.8V</td><td>0.04V</td><td>0V</td></tr><tr><td>Q201, 202</td><td>-10.8V</td><td>0V</td><td>0V</td><td>+0.43V</td><td>0V</td><td>0V</td><td>-10.8V</td><td>0V</td><td>0V</td></tr><tr><td>Q205, 206</td><td>0V</td><td>-1.45V</td><td>-10.62V</td><td>-1.42V</td><td>-1.42V</td><td>-0.77V</td><td>-1.42V</td><td>-1.42V</td><td>-0.77V</td></tr><tr><td>Q207, 208</td><td>-1.45V</td><td>-1.45V</td><td>-0.83V</td><td>0V</td><td>-1.42V</td><td>-10.7V</td><td>0V</td><td>-1.42V</td><td>-10.71V</td></tr><tr><td>Q209, 210</td><td>0V</td><td>0V</td><td>0.61V</td><td>-0.15V</td><td>0V</td><td>-10.7V</td><td>0V</td><td>0V</td><td>-10.7V</td></tr><tr><td>Q211, 212</td><td>-0.11V</td><td>0V</td><td>-10.61V</td><td>0V</td><td>0V</td><td>0.63V</td><td>0V</td><td>0V</td><td>0.64V</td></tr><tr><td>Q213, 214</td><td>0V</td><td>-0.1V</td><td>-10.56V</td><td>0V</td><td>-0.1V</td><td>-10.56V</td><td>-0.29V</td><td>-0.29V</td><td>0.33V</td></tr><tr><td>Q215, 216</td><td>-0.1V</td><td>-0.1V</td><td>0.47V</td><td>0V</td><td>-0.1V</td><td>-10.65V</td><td>0V</td><td>-0.29V</td><td>-10.65V</td></tr><tr><td>Q217, 218</td><td>0V</td><td>0.01V</td><td>-10.62V</td><td>0V</td><td>0V</td><td>0.64V</td><td>0V</td><td>0V</td><td>0.64V</td></tr><tr><td>Q219, 220</td><td>0.01V</td><td>0V</td><td>0.62V</td><td>-1.42V</td><td>0V</td><td>-10.7V</td><td>-1.42V</td><td>0V</td><td>-10.71V</td></tr><tr><td>Q223, 224</td><td>-10.75V</td><td>-10.54V</td><td>-10.61V</td><td>-10.72V</td><td>10.64V</td><td>-10.62V</td><td>-10.77V</td><td>-10.76V</td><td>-10.12V</td></tr></table>	Transistor Ref. No.	Encode (dbx tape)			Decode (dbx tape)			disc			E (G)	C (S)	B (D)	E (G)	C (S)	B (D)	E (G)	C (S)	B (D)	Q30	0V	0.015V	0.62V	-0.001V	1.168V	0.017V	0V	0.58V	0.018V	Q31	0V	10.66V	-0.001V	-0.001V	0.006V	0.65V	-0.001V	0.006V	0.65V	Q32	10.78V	-10.62V	10.72V	10.77V	10.75V	10.1V	10.78V	10.74V	10.1V	Q33	-10.72V	5.97V	-10.67V	-10.72V	-10.70V	-10.04V	-10.73V	-10.70V	-10.04V	Q3	0.074V	-0.029V	0V	1.69V	1.64V	0.99V	0.055V	-0.035V	0V	Q11, 12	-10.8V	0V	0V	0.65V	0.04V	0.04V	0.65V	0.04V	0.04V	Q13, 14	0.58V	0V	0V	-10.8V	0.04V	0V	-10.8V	0.04V	0V	Q201, 202	-10.8V	0V	0V	+0.43V	0V	0V	-10.8V	0V	0V	Q205, 206	0V	-1.45V	-10.62V	-1.42V	-1.42V	-0.77V	-1.42V	-1.42V	-0.77V	Q207, 208	-1.45V	-1.45V	-0.83V	0V	-1.42V	-10.7V	0V	-1.42V	-10.71V	Q209, 210	0V	0V	0.61V	-0.15V	0V	-10.7V	0V	0V	-10.7V	Q211, 212	-0.11V	0V	-10.61V	0V	0V	0.63V	0V	0V	0.64V	Q213, 214	0V	-0.1V	-10.56V	0V	-0.1V	-10.56V	-0.29V	-0.29V	0.33V	Q215, 216	-0.1V	-0.1V	0.47V	0V	-0.1V	-10.65V	0V	-0.29V	-10.65V	Q217, 218	0V	0.01V	-10.62V	0V	0V	0.64V	0V	0V	0.64V	Q219, 220	0.01V	0V	0.62V	-1.42V	0V	-10.7V	-1.42V	0V	-10.71V	Q223, 224	-10.75V	-10.54V	-10.61V	-10.72V	10.64V	-10.62V	-10.77V	-10.76V	-10.12V
Transistor Ref. No.	Encode (dbx tape)			Decode (dbx tape)			disc																																																																																																																																																																																							
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Q30	0V	0.015V	0.62V	-0.001V	1.168V	0.017V	0V	0.58V	0.018V																																																																																																																																																																																					
Q31	0V	10.66V	-0.001V	-0.001V	0.006V	0.65V	-0.001V	0.006V	0.65V																																																																																																																																																																																					
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Q3	0.074V	-0.029V	0V	1.69V	1.64V	0.99V	0.055V	-0.035V	0V																																																																																																																																																																																					
Q11, 12	-10.8V	0V	0V	0.65V	0.04V	0.04V	0.65V	0.04V	0.04V																																																																																																																																																																																					
Q13, 14	0.58V	0V	0V	-10.8V	0.04V	0V	-10.8V	0.04V	0V																																																																																																																																																																																					
Q201, 202	-10.8V	0V	0V	+0.43V	0V	0V	-10.8V	0V	0V																																																																																																																																																																																					
Q205, 206	0V	-1.45V	-10.62V	-1.42V	-1.42V	-0.77V	-1.42V	-1.42V	-0.77V																																																																																																																																																																																					
Q207, 208	-1.45V	-1.45V	-0.83V	0V	-1.42V	-10.7V	0V	-1.42V	-10.71V																																																																																																																																																																																					
Q209, 210	0V	0V	0.61V	-0.15V	0V	-10.7V	0V	0V	-10.7V																																																																																																																																																																																					
Q211, 212	-0.11V	0V	-10.61V	0V	0V	0.63V	0V	0V	0.64V																																																																																																																																																																																					
Q213, 214	0V	-0.1V	-10.56V	0V	-0.1V	-10.56V	-0.29V	-0.29V	0.33V																																																																																																																																																																																					
Q215, 216	-0.1V	-0.1V	0.47V	0V	-0.1V	-10.65V	0V	-0.29V	-10.65V																																																																																																																																																																																					
Q217, 218	0V	0.01V	-10.62V	0V	0V	0.64V	0V	0V	0.64V																																																																																																																																																																																					
Q219, 220	0.01V	0V	0.62V	-1.42V	0V	-10.7V	-1.42V	0V	-10.71V																																																																																																																																																																																					
Q223, 224	-10.75V	-10.54V	-10.61V	-10.72V	10.64V	-10.62V	-10.77V	-10.76V	-10.12V																																																																																																																																																																																					
NOTE:	If no abnormality is found in steps 1 and 2, check the operation for each part as follows:																																																																																																																																																																																													
3 Operation check of INPUT BAND PASS FILTER circuit (27Hz—20kHz) Condition: - Record mode - Input level controls... MAX - Noise reduction selector... dbx tape Equipment: - VTVM - AF oscillator - ATT - Oscilloscope - Resistor (600Ω)	1. Make the connections as shown in fig. 14, and apply 100Hz — 27dB signal from LINE IN, and set the noise reduction selector to dbx tape position. 2. Set the unit to record mode. 3. Adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) is 300mV. 4. Make sure that the emitter signal level of Q203 (L-CH) and Q204 (R-CH) is 300mV. 5. Set the input signal frequency to 5kHz and make sure that the emitter signal of Q203 (L-CH) and Q204 (R-CH) remains at the same level (300mV).  Fig. 14																																																																																																																																																																																													
4 Operation check of VCA circuit and Pre-emphasis/De-emphasis circuit Condition: - Stop/record mode - Input level controls... MAX - Noise reduction selector... disc/dbx tape Equipment: - VTVM - AF oscillator - ATT - Oscilloscope - Resistor (600Ω)	4-1 Operation check of VCA circuit and Pre-emphasis circuit 1. Make the connections as shown in fig. 15, and apply 100Hz — 27dB signal from LINE IN. 2. Short pin ③ of IC201 (L-CH) and IC202 (R-CH) to TP207 (ground) as shown in fig. 16. 3. Set the unit to record mode, and set the noise reduction selector to dbx tape position. 4. Adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) is 300mV. 5. Make sure that the output signals at TP203 (L-CH) and TP204 (R-CH) are sinusoidal. (The operation of VCA can then be checked.) 6. Shift the frequency of input signal to 5kHz, and make sure that the output signal levels at TP203 (L-CH) and TP204 (R-CH) are increased by about 12dB. (The operation of the Pre-emphasis circuit can then be checked.)  Fig. 15  Fig. 16																																																																																																																																																																																													

ITEM	CHECKING METHOD
	4-2 Operation check of VCA circuit and De-emphasis circuit 1. The procedure is the same as 1 for the above 4-1 VCA circuit and Pre-emphasis circuit. 2. Short pin ② of IC201 (L-CH) and IC202 (R-CH) to TP207 (ground) as shown in fig. 17. 3. Set the noise reduction selector to disc position. 4. Adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) is 300mV. 5. Make sure that the output signals at TP203 (L-CH) and TP204 (R-CH) are sinusoidal. (The operation of VCA can then be checked.) 6. Change the frequency of input signal to 5 kHz and make sure that the output signal level at TP203 (L-CH) and TP204 (R-CH) is decreased by about 12 dB. (The operation of the De-emphasis circuit can then be checked.)  Fig. 17
5 Operation check of RMS FILTER circuit (27 Hz—10 kHz) Condition: • Stop mode • Input level controls ... MAX • Noise reduction selector ... disc Equipment: • VTVM • AF oscillator • ATT • Oscilloscope • Resistor (600 Ω)	1. Make the connections as shown in fig. 18, and apply 100 Hz -27 dB signal from LINE IN. 2. Set the noise reduction selector to disc position. 3. Adjust ATT so that the signal level at TP201 (L-CH) and TP202 (R-CH) is 300 mV. 4. Make sure that the emitter signal level of Q221 (L-CH) and Q222 (R-CH) is around 300 mV. 5. Change the frequency of input signal to 5 kHz and make sure that the emitter signal of Q221 (L-CH) and Q222 (R-CH) remains at the same level (300 mV).  Fig. 18

ELECTRICAL PARTS LOCATION



REPLACEMENT PARTS LIST

Important safety notice
Components identified by Δ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref No.	Part No.	Part Name & Description
ELECTRICAL PARTS		
E 1	QWY4123Z	Record/Playback Head
E 2	QWY2138Z	Erase Head
E 3	[D] Δ SJA88	AC Power Cord
[For all European areas except United Kingdom.]		
[B] Δ QFC1205		
[For United Kingdom.]		
E 4	QTD1164	Cord Bushing
E 5	QMA4402	dbx P.B. Holder
E 6	XTN3 + 16B	Tapping Screw
E 7	XTN3 + 10B	Tapping Screw
E 8	XTN3 + 8B	Tapping Screw
E 9	XTS3 + 12B	Tapping Screw
E 10	XTB3 + 10BFN	Tapping Screw
E 11	QTD1181	Wire Clamper
E 12	QJ5003S	Jack Board
E 13	QJP1921TN	3 Pin Post
E 14	QJP1922TN	6 Pin Post
E 15	QJP1923TN	9 Pin Post
E 16	QJP1924TN	12 Pin Post
E 17	QJS1924TNL	12 Pin Socket
E 18	Δ QCR0011	Spark Killer
E 19	SJT777	Pin Terminal
E 20	XTN3 + 8B	Tapping Screw
E 21	QMA4364	Switch Angle
E 22	XSN3 + 8S	Screw
E 23	XWA3B	Washer
E 24	Δ QTF1054	Fuse Holder
E 25	QJS12001T	12 Pin Socket
E 26	XTN3 + 10B	Tapping Screw
E 27	QJT0015	Lug Terminal
E 28	QTH1164	Heat Sink
E 29	XSN3 + 8S	Screw
E 30	XWA3B	Washer
E 31	XWE3	Washer
E 32	N024B	Insulator Plate
E 33	N018E	Insulator Plate
E 34	QSIFM004F	FL Meter
E 35	QJT1067	Check Pin
E 36	QKJ0520	Led Holder-A
E 37	QJS15001T	15 Pin Socket
E 38	QKJ0521	LED Holder-B
E 39	QJC0050	Earth Plate
E 40	QMA4365	Timer Angle
E 41	XTN3 + 6B	Tapping Screw
E 42	XAMQ44P300	Pilot Lamp
E 43	QJS06001T	6 Pin Socket
E 44	QJP06S001T	6 Pin Post
E 45	QJP12L001T	12 Pin Post (L-type)
E 46	QJP15L001T	15P Post (L-type)
E 47	QNJ1070	Nut
E 48	QNJ1039	Nut
E 49	QNJ1004	Nut
E 50	QJS1923TN	9 Pin Socket
E 51	QJS1922TN	6 Pin Socket
E 52	QJS1921TN	3 Pin Socket
E 53	QJT1054	Contact
E 54	XTN3 + 10BFN	Tapping Screw
E 55	QJI1466RR	Leaf Switch Circuit Board
E 56	QJT1089	Contact

[illegible]

Record/Playback Head
Erase Head
AC Power Cord
United Kingdom.]
AC Power Cord

Cord Bushing
dbx P.B. Holder
Tapping Screw
Tapping Screw
Tapping Screw
Tapping Screw
Tapping Screw

Wire Clamper
Jack Board
3 Pin Post
6 Pin Post
9 Pin Post
12 Pin Post
12 Pin Socket
Spark Killer
Pin Terminal
Tapping Screw

Switch Angle
Screw
Washer
Fuse Holder
12 Pin Socket
Tapping Screw
Lug Terminal
Heat Sink
Screw
Washer

Washer
Insulator Plate
Insulator Plate
FL Meter
Check Pin
Led Holder-A
15 Pin Socket
LED Holder-B
Earth Plate
Timer Angle

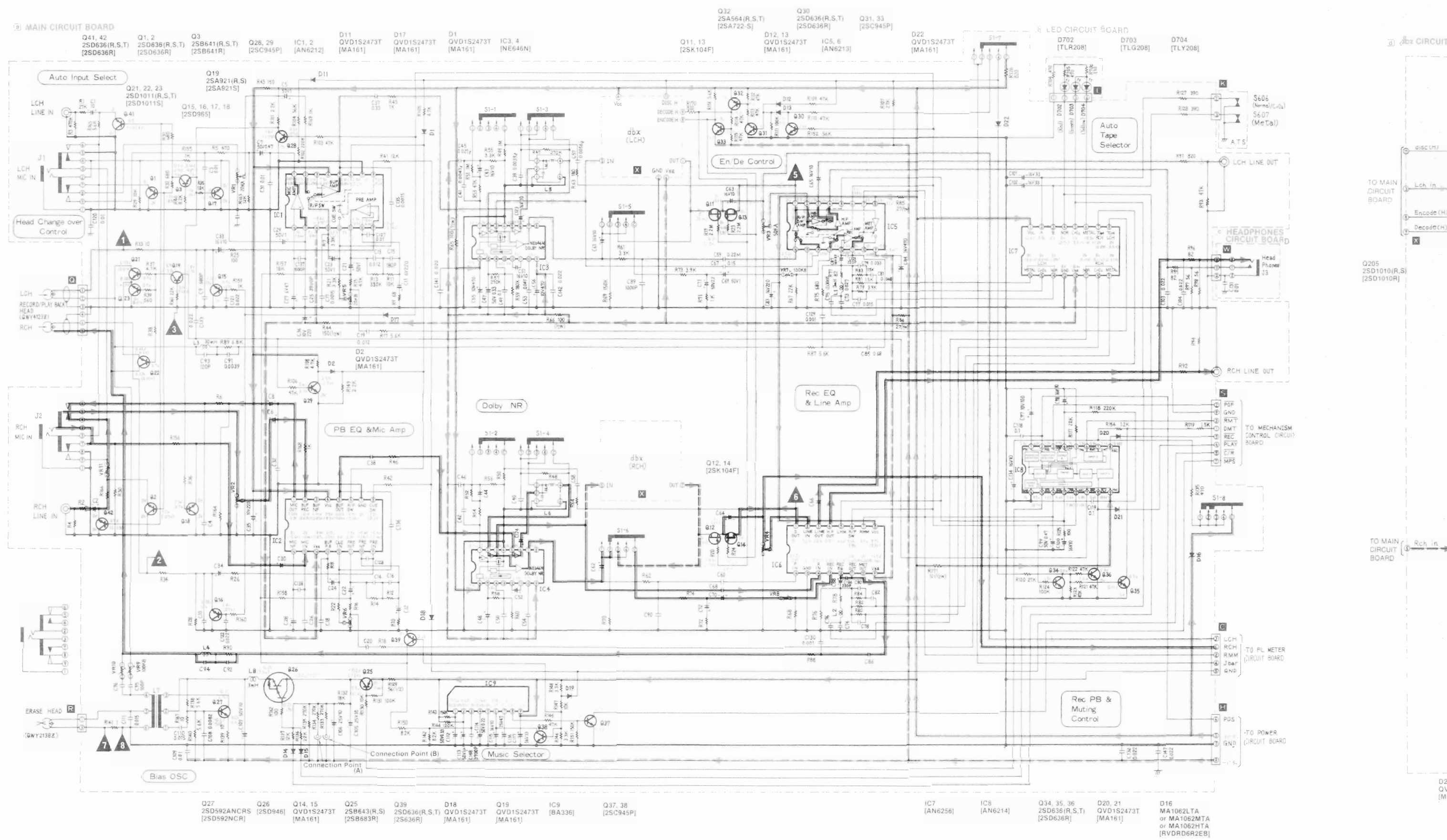
Tapping Screw
Pilot Lamp
6 Pin Socket
6 Pin Post
12 Pin Post (L-type)
15P Post (L-type)
Nut
Nut
Nut
9 Pin Socket

6 Pin Socket
3 Pin Socket
Contact
Tapping Screw
Leaf Switch Circuit Board
Contact

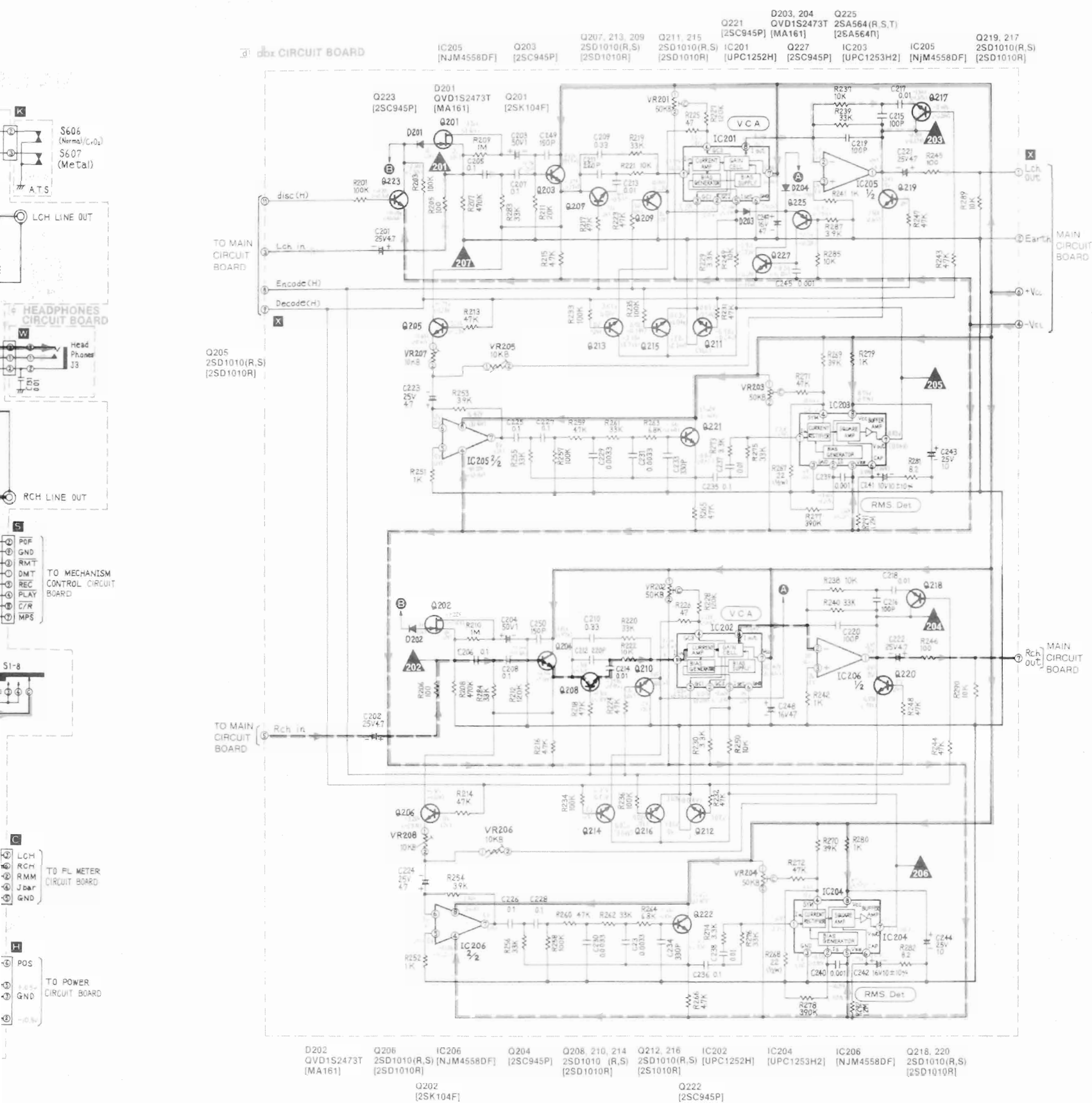
[illegible]

SCHEMATIC DIAGRAM MAIN SECTION

dbx SEC

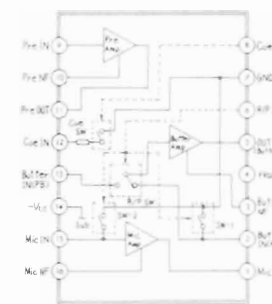


dbx SECTION



EQUIVALENT CIRCUITS

IC1,2 AN6212



Truth table of IC1, 2 (Postive)

R / P SW	
6 pin	Operation
H	REC
L	PB

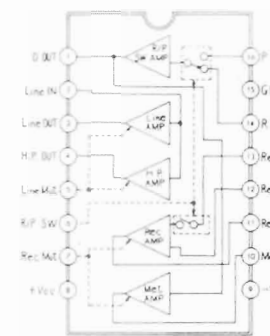
SW-1, SW-2

6 pin	Operation
H	—
L	Mute

Cue SW

8 pin	Operation
H	—
L	Cue

IC5,6 AN6213



Truth table of IC5, 6 (Positive)

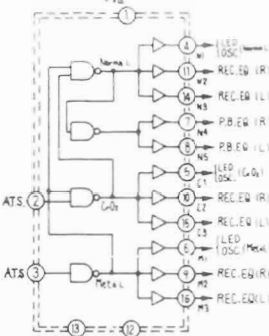
R / P SW	
6 pin	Operation
H	REC
L	PB

Muting

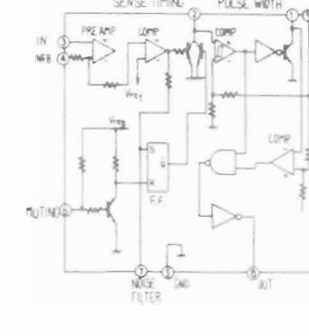
5, 7 Pin	Operation
H	Muting OFF
L	Muting ON

L : GND Level

IC7 AN6256



IC9 BA336



- NOTES:
- S1-1 ~ S1-8 NR select switch (shown in OUT position: (1) Dolby NR, (2) OUT, (3) dbx tape, (4) dbx disc)
 - S606 Auto tape select switch (For Normal/CrO₂ tape)
 - S607 Auto tape select switch (For Metal tape)

Mode	S606	S607
Normal	on	on
CrO ₂	on	off
Metal	off	off

- VR1, 2 Input level controls.
- VR3, 4 Output level control.
- VR5, 6 Playback gain adjustment VR.
- VR7, 8 Recording gain adjustment VR.
- VR9, 10 Bias current adjustment VR.
- VR201, 202 VCA symmetry adjustment VR.
- VR203, 204 RMS detector adjustment VR.
- VR205, 206 dbx standard level adjustment VR (Encode).
- VR207, 208 dbx standard level adjustment VR (Decode).
- Resistance are in ohms (Ω), 1M = 1,000 k (Ω)
- Capacity are in microfarads (μF) unless specified otherwise.
- P = Pico-farads.
- The mark (▼) shows test point. e.g. v = test point 1.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position otherwise specified.
- Voltage values shown in MAIN SECTION.
 - NO MARK Voltage values at out (NR select switch) mode
 - Voltage values at record mode.
 - Voltage values at disc (NR select switch) mode
- Voltage values shown in dbx SECTION.
 - Voltage values at out (NR select switch) mode.
 - Voltage values at disc (NR select switch) mode.
- For measurement use VTVM.

- (+) indicates B + (bias).
- (-) indicates B - (bias).
- (→) indicates the flow of the playback signal (dbx out).
- (→) indicates the flow of the playback signal (dbx tape).
- (→) indicates the flow of the recording signal (dbx out).
- (→) indicates the flow of the recording signal (dbx tape).
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors and diodes. One type of number is used for supply parts number and production parts number when they are identical.

e.g. Q1
2SC1844 (E, F) ← Production parts number
[2SC1844E] ← Supply parts number
D212
1S2473T77 ← Production parts number.
[MA161] ← Supply parts numbers

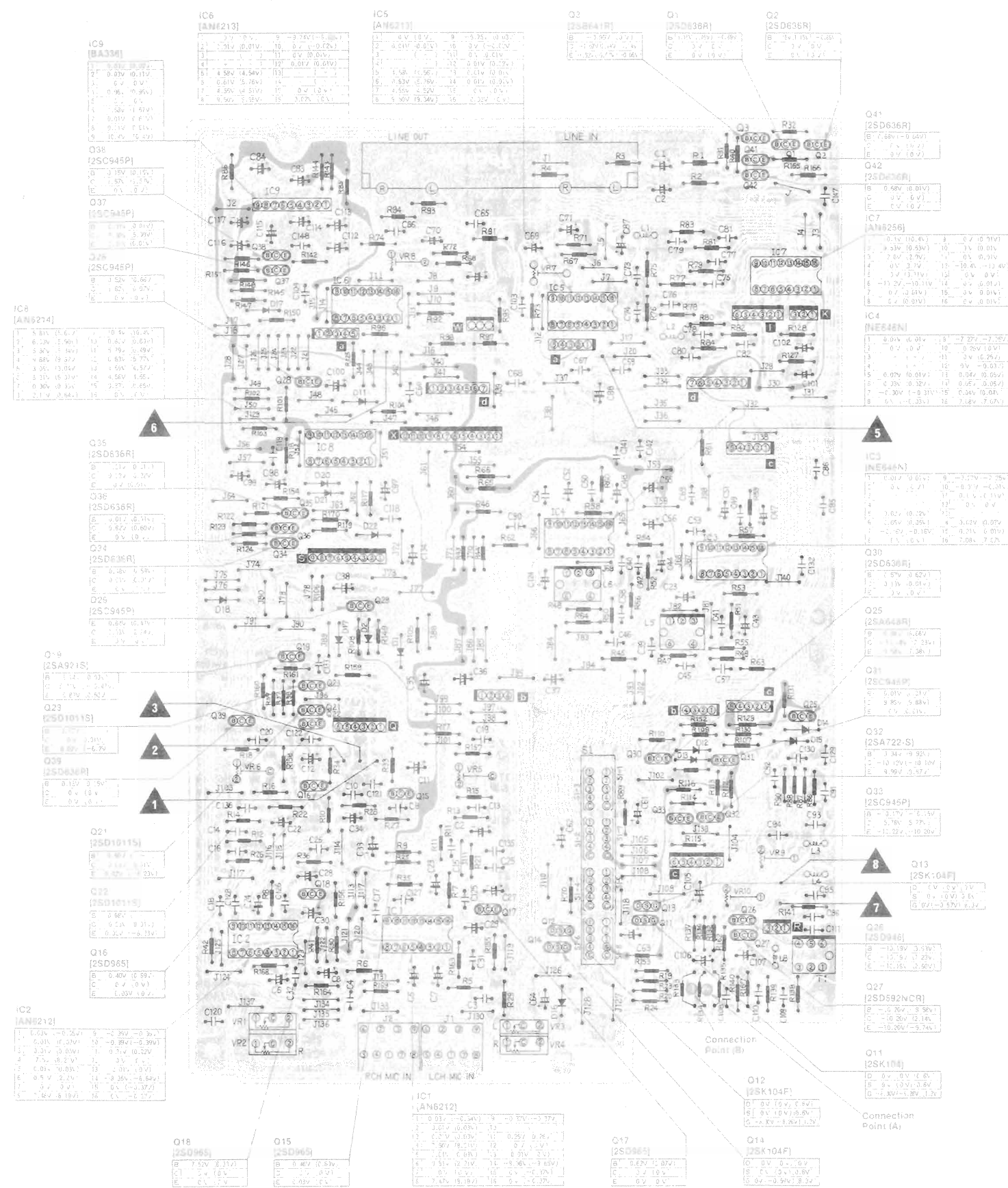
- The supply parts number is described alone in the replacement parts list.
- This schematic diagram may be modified at any time with the development of new technology.

SPECIFICATIONS

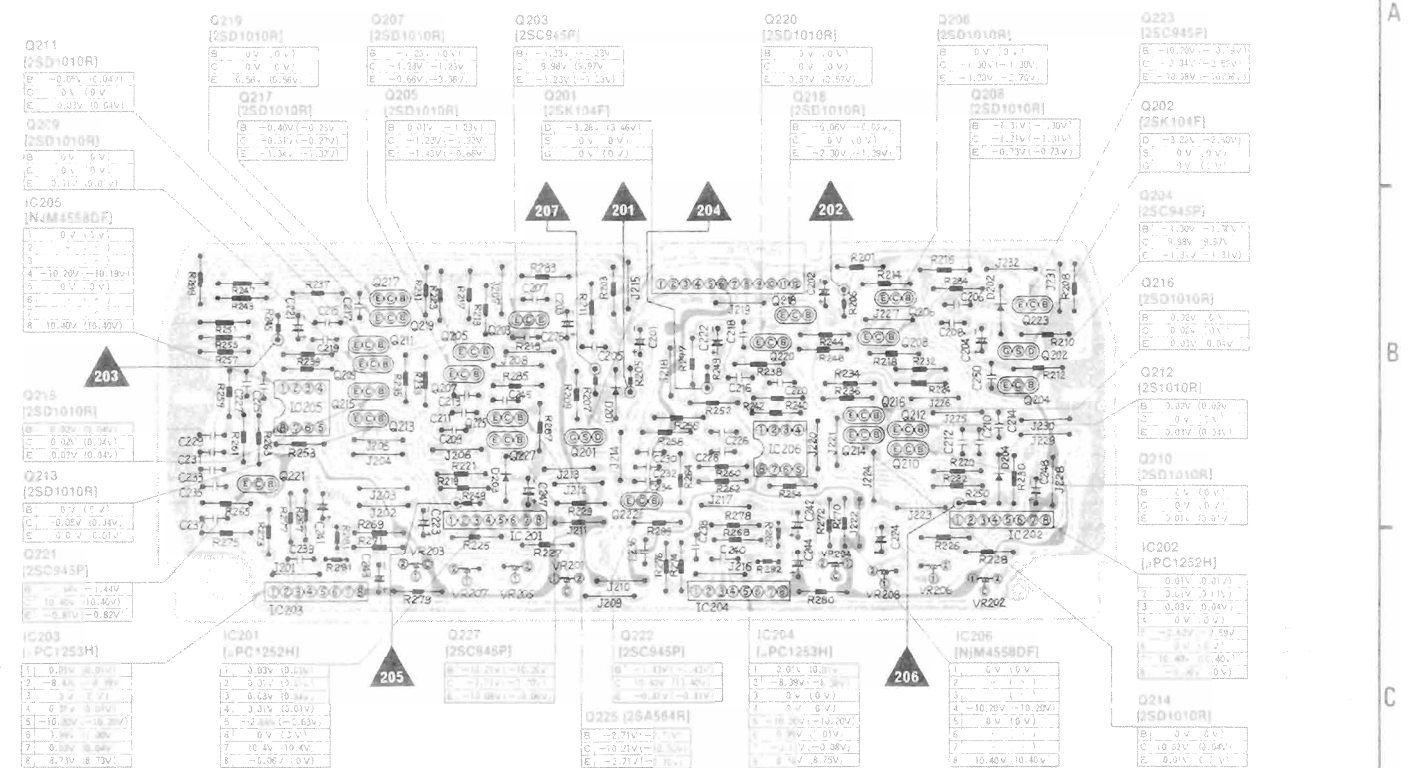
Playback S/N ratio	Greater than 45 dB
• Test tape ... QZZCFM	
Overall distortion	Less than 4%
• Test tape	
... QZZCRA for Normal	
... QZZCRX for CrO ₂	
... QZZCRZ for Metal	
Overall S/N ratio	Greater than 43 dB (without NAB filter)
• Test tape ... QZZCRA	

CIRCUIT BOARDS

a MAIN CIRCUIT BOARD



d dbx CIRCUIT BOARD



TERMINATIONS

IC1 - 8	IC9	IC201 - 204	IC205, 206	Q1 - 3, 30, 34, 35, 36, 39, 41, 42, 203, 204, 221 - 223, 227	Q12 - 14, 25, 28, 29, 31, 32, 33, 37, 38, 201, 202
Q15 - 19, 21 - 23, 27, 205 - 220, 225	Q26	D1, 2, 11 - 22, 201 - 204	D702(Red) D704(Yellow) D703(Green)	L5, 6	Marking
					L7
					L1, 2, 8, 3, 4

NOTES:

- The circuit shown in on the conductor is B + (bias) circuit.
- The circuit shown in on the conductor is B - (bias) circuit.
- Values indicated in are under no signal condition and playback mode with volume control at minimum position otherwise specified.
- Voltage values shown in MAIN CIRCUIT BOARD
 - NO MARK ... Voltage values at Out (NR select switch) mode
 - Voltage values at record mode
 - Voltage values at disc (NR select switch) mode
- Voltage values shown in dbx CIRCUIT BOARD
 - NO MARK ... Voltage values at dbx tape (NR select switch) mode
 - Voltage values at Out (NR select switch) mode.
- For measurement use VTVM.
- This circuit board diagram may be modified at any time with the development of new technology.

NOTES: RESISTORS

ERD... Carbon
ERG... Metal-oxide
ERS... Metal-oxide
ERO... Metal-film
ERX... Metal-film
ERQ... Fuse type metallic
ERC... Solid
ERF... Cement

CAPACITORS

ECBA . . .	Ceramic
ECG . . .	Ceramic
ECK . . .	Ceramic
ECC . . .	Ceramic
ECF . . .	Ceramic
ECQM . . .	Polyester film
ECQE . . .	Polyester film
ECQF . . .	Polypropylene

ECE Electrolytic

ECE : N . . . Non polar electrolytic

ECQS Polystyrene

ECS Tantalum

QCS Tantalum

REPLACEMENT PARTS LIST

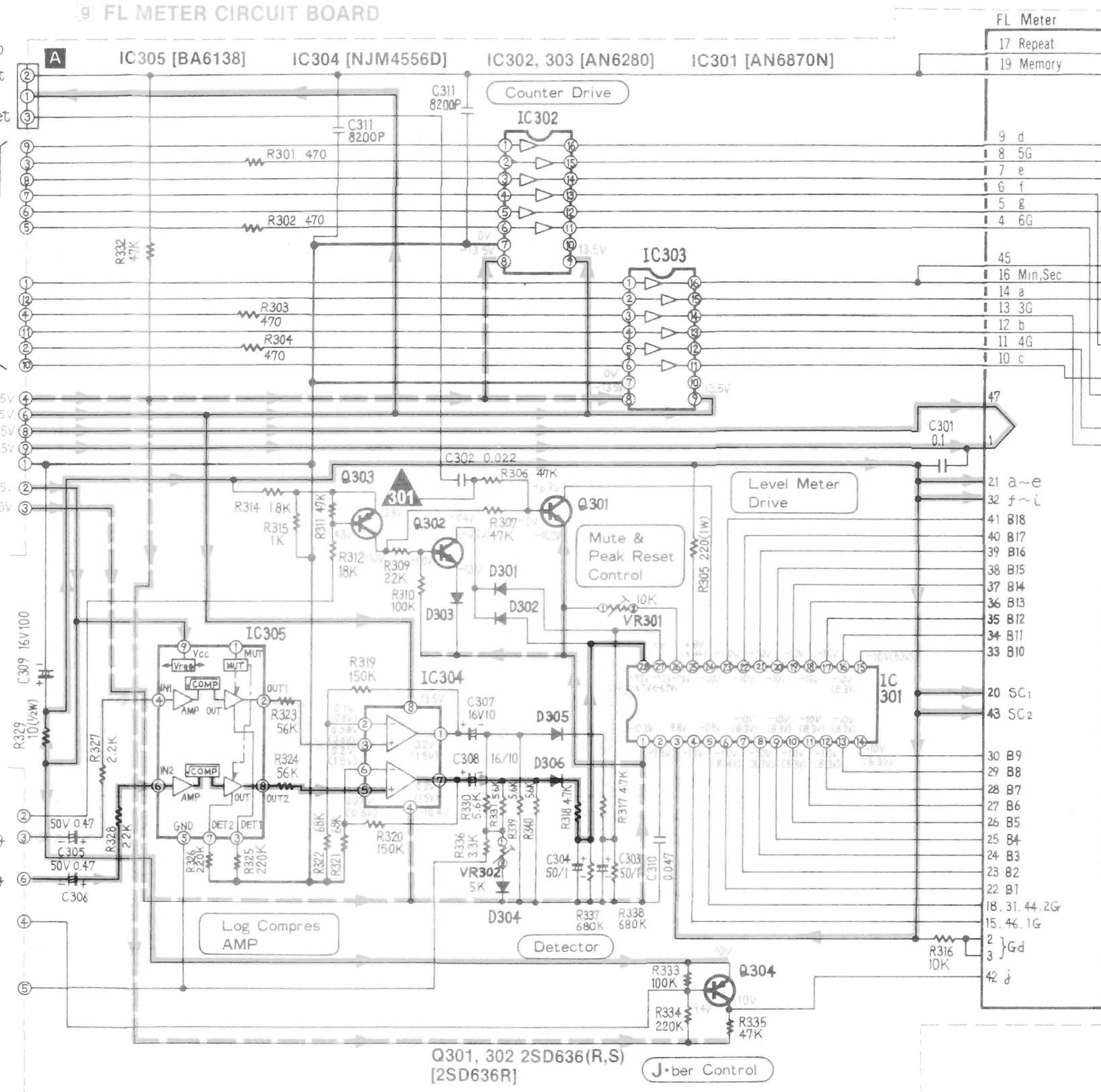
Important safety notice
Components identified by  mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

Ref No.	Part No.	Ref No.	Part No.	Ref No.	Part No.	Ref No.	Part No.	Ref No.	Part No.	Ref No.	Part No.		
RESISTORS		R 130	ERD25FJ103	R 277, 278	ERD25TJ394	VR 302	EVNM44A00B53	C 121, 122	ECKD1H223ZF	C 505	ECKD1H332ZF	407, 408, 409	SM112
R 1, 2	ERD25TJ273	R 131	ERD25TJ104	R 279, 280	ERD25FJ102	VR 501	EVNM44A00B14	C 123, 124	ECEA1HS100	C 506	ECEA50ZR2R2	D 410, 411	MA1056
R 3, 4	ERD25TJ474	R 132	ERD25TJ183	R 281, 282	ERD25FJ8R2	CAPACITORS		C 125, 126	ECCD1H221K	C 507	ECKD1H222MD	D 412, 413	MA161
R 5, 6	ERD25FJ471	R 133, 134, 135		R 283, 284	ERD25TJ333			C 127, 128	ECKD1H103ZF	C 508	ECEA1CN100	D 414, 415	MA1150A
R 7, 8	ERD25FJ332		ERD25TJ274	R 285	ERD25FJ103			C 129, 130	ECKD1H102KB	C 511	ECEA50ZR1	D 416	MA1033LLF
R 9, 10	ERD25FJ680	R 136	ERD25TJ223	R 287	ERD25FJ392	C 1, 2	ECEA1HS100	C 132, 133	ECKD1H223ZF	C 702	ECCD1H390KC	D 501, 502, 503, 504, 505, 506,	507, 508, 509, 510, 511, 512,
R 11, 12	ERD25FJ103	R 137	ERD25TJ123	R 289, 290	ERD25FJ103	C 3, 4	ECFDD103KXY	C 135, 136	ECQM1H152JZ	C 703	ECCD1H101KC	513, 514	MA161
R 13, 14	ERD25TJ334	R 138	ERD25FJ562	R 291, 292	ERD25TJ125	C 5, 6	ECEA50Z1	C 141, 142, 147		C 704	ECCD1H470KC	D 515	LN41YPHL
R 15, 16	ERD25FJ472	R 139	ERD25FJ100	R 301, 302, 303, 304	ERD25FJ103	C 7, 8	ECEA50ZR47		ECKD1H223ZF	C 148	ECKD1H392KB		
R 17, 18	ERD25FJ562	R 140	ERD25FJ562			C 9, 10	ECKD1H681KB	C 149	ECKD1H392KB	C 201, 202	ECEA25Z47R	COMBINATION PARTS	
R 19, 20	ERD25TJ225	R 141	ERD25FJ1R0	R 306, 307	ERD25TJ473	C 11, 12	ECEA1AS221	C 203, 204	ECEA50Z1	C 205, 206, 207, 208		Z 501	EXBEQ5273K
		R 142	ERD25FJ822	R 309	ERD25TJ223	C 13, 14	ECQM1H123JZ			Z 502	EXBD86181K	D 516	LN31GPHL
R 21, 22	ERD25FJ332	R 143	ERD25TJ154	R 310	ERD25TJ104	C 15, 16	ECCD1H181K			Z 503	EXBEQ4272K	D 517	LN21RPHL
R 23, 24	ERD25TJ225	R 144	ERD25TJ124	R 311	ERD25TJ473	C 17, 18	ECQM1H152JZ			Z 504	QCRFWA1	D 702	TLR208
R 25, 26	ERD25FJ101	R 145	ERD25TJ473	R 312	ERD25FJ183	C 19, 20	ECQM1H123JZ			Z 505	EXFP4772Z	D 703	TLG208
R 27, 28	ERD25FJ103	R 146	ERD25FJ332	R 314	ERD25FJ182	C 21, 22, 23, 24				Z 506	EXBD8825K	D 704	TLY208
R 29, 30	ERD25FJ103	R 147	ERD25FJ103	R 315	ERD25FJ102							INTEGRATED CIRCUITS	
R 31, 32	ERD25FJ681	R 148	ERD25FJ103	R 316	ERD25FJ103	C 25, 26	ECEA1AS470					IC 1	AN6212
R 33, 34	ERD25FJ100	R 149	ERD25FJ332	R 318	ERD25FJ472	C 27, 28	ECEA50M1R					IC 2	MA6212
R 35, 36	ERD25FJ182	R 150	ERD25FJ822	R 320	ERD25TJ154	C 29, 30	ECEA16M10R					IC 3, 4	NE646N
R 37, 38	ERD25FJ472	R 151	ERD25TJ154			C 31, 32	ECKD1H103ZF					IC 5, 6	AN6213
R 39	ERD25FJ561	R 152	ERD25TJ563	R 321, 322	ERD25TJ683	C 33, 34	ECEA16M10R					IC 7	AN6256
R 40	ERD25FJ822			R 323, 324	ERD25TJ563	C 35, 36	ECEA1AS221					IC 8	AN6214
				R 325, 326	ERD25TJ224	C 37, 38	ECQV05334JZ					IC 9	BA336
R 41, 42	ERD25TJ123	R 153	ERD25FJ471	R 327, 328	ERD25FJ222	C 39, 40	ECQM1H392JZ					IC 201, 202	UPC1252H
R 43, 44	ERD50FJ151	R 154	ERD25FJ122	R 330	ERD25FJ562	C 41, 42	ECQM1H472JZ					IC 203, 204	UPC1253H2
R 45, 46	ERD25FJ102	R 155, 156	ERD25FJ102	R 332	ERD25TJ473							IC 205, 206	NJM4A558DF
R 47, 48	ERD25TJ274	R 157, 158	ERD25TJ183	R 333	ERD25TJ104	C 43, 44	ECEA1HS100					IC 301	AN6870N
R 49, 50, 51, 52		R 159, 160	ERD25FJ102	R 334	ERD25TJ224	C 45, 46	ECQM1H273JZ					IC 302, 303	AN6280
	ERD25TJ105	R 161	ERD25TJ223	R 335	ERD25TJ473	C 47, 48	ECEA1HSR33					IC 304	NJM4A556D
R 53, 54	ERD25TJ473	R 162	ERD25FJ101	R 336	ERD25FJ332	C 49, 50	ECQM1H104JZ					IC 305	BA6138
R 55, 56	ERD25FJ332	R 163, 164	ERD25TJ123			C 51, 51	ECEA1HS100					IC 501	MN1405RH
R 57, 58	ERD25TJ274	R 165, 166	ERD25FJ562	R 339, 340	ERD25FJ562	C 53, 54	ECFDD473KXY					IC 502	AN6270
R 59, 60	ERD25TJ184	R 167	ERD25FJ100	R 401	△ ERD25FJ102	C 55, 56	ECEA1AS471					IC 503	DN6838A
R 61, 62	ERD25FJ332			R 402	△ ERQ12HJ2R7P	C 57, 58	ECQM1H562JZ					IC 701	M54816P
				R 403	△ ERD25FJ102	C 59, 60	ECQV05224JZ						
R 63, 64	ERD25FJ181	R 168, 169	ERD25FJ102	R 404	ERD25FJ471	C 61, 62, 63, 64	ECEA1HS100						
R 65, 66	ERD50FJ101	R 170	ERD25FJ821	R 405	ERD25FJ391								
R 67, 68	ERD25TJ223	R 171	ERQ12HJ100	R 406	ERD25FJ332	C 65, 66	ECEA1EN3R3						
R 69, 70	ERD25TJ104	R 201, 203	ERD25TJ100	R 407	ERD25FJ472	C 67, 68	ECQV05154JZ						
R 71, 72	ERD25FJ152	R 205, 206	ERD25FJ101	R 408	ERD25FJ103	C 69, 70	ECESA50Z1						
R 73, 74	ERD25FJ392	R 207	ERD25FJ474	R 409	△ ERD25FJ102	C 71, 72	ECEA50Z2R2						
R 75, 76	ERD25FJ681	R 208	ERD25TJ474			C 73, 74	ECQM1H273JZ						
R 77, 78	ERD25FJ820	R 209, 210	ERD25TJ105										
R 79, 80	ERD25FJ392	R 211, 212	ERD25TJ124										
R 81, 82, 83, 84		R 213, 214	ERD25TJ473	R 410	△ ERQ12HJ2R7P								
	ERD25FJ152			R 411	△ ERD25FJ102								
R 85, 86	ERQ12HJ270	R 215, 216	ERD25FJ472	R 412	ERD25FJ103								
R 87, 88	ERD25FJ562	R 217, 218	ERD25TJ473	R 413	ERD25TJ823								
R 89, 90	ERD25FJ682	R 219, 220	ERD25TJ333	R 414	△ ERX2ANJ5R6								
R 91, 92	ERD25FJ821	R 221, 222	ERD25FJ103	R 415	△ ERD25FJ102								
R 93, 94	ERD25TJ473	R 223, 224	ERD25TJ473	R 416	ERD25FJ103								
R 95, 96	ERD25FJ820	R 225, 226	ERD25FJ470	R 417	△ ERD25FJ821								
R 97, 98	ERD25FJ560	R 227, 228	ERD25TJ124	R 418	ERD50FJ331								
R 101	ERD25FJ222	R 229, 230	ERD25FJ332	R 419	ERD25FJ121								
R 102	ERD25TJ224	R 231, 232	ERD25TJ473										
R 103	ERD25TJ473	R 233, 234, 235, 236		R 420	ERD50FJ331								
			ERD25TJ104	R 421	ERD25TJ104								
R 104	ERD25TJ563	R 237, 238	ERD25FJ103	R 422	ERD25TJ223								
R 105	ERD25FJ472	R 239, 240	ERD25TJ333	R 423	ERD25TJ123								
R 106	ERD25TJ473	R 241	ERD25FJ102	R 424	ERD25FJ560								
R 107	ERD25TJ273	R 242	ERD25FJ102	R 425, 426	ERD50FJ271								
R 108	ERD25FJ472	R 243, 244	ERD25TJ473	R 428	ERD25FJ392								
R 109, 110	ERD25TJ473	R 245, 246	ERD25FJ101	R 429	ERD25FJ562								
R 111	ERD25TJ104	R 247, 248	ERD25TJ473	R 430	ERD25TJ683								
R 112, 113, 114, 115		R 249, 250	ERD25FJ103	R 701	ERD25FJ222								
	ERD25TJ473	R 251, 252	ERD25FJ102	R 702	ERD25FJ221								
R 116	ERD25FJ562	R 253, 254	ERD25FJ392	R 703	ERD25FJ331								
R 117	ERD25TJ223			R 704, 705	ERD25FJ471								
				R 706	ERD25FJ331								
R 118	ERD25TJ224	R 255, 256	ERD25TJ333	VARIABLE RESISTORS									
R 119	ERD25FJ152	R 257, 258	ERD25TJ104	VR 1, 2	EWJ5SAF22A24								
R 120	ERD25TJ273	R 259, 260	ERD25FJ472	VR 3, 4	QWKGTAA024A54								
R 121, 122, 123		R 261, 262	ERD25TJ333	VR 5, 6	EVNM44A00B24								
	ERD25TJ473	R 263, 264	ERD25FJ682	VR 7, 8, 9, 10	EVNM44A00B15								
R 124	ERD25TJ104	R 265, 266	ERD25FJ472	VR 201, 202, 203, 204									
R 125	ERD25FJ101	R 267, 268	ERQ12HJ220		EVNM0AA00B54								
R 126	ERD25FJ821	R 269, 270	ERD25TJ393										
R 127, 128	ERD25FJ391	R 271, 272	ERD25TJ473										
R 129	ERD50FJ560	R 273, 274	ERD25FJ332										
		R 275, 276	ERD25TJ333	VR 205, 206, 207, 208									
				VR 301	EVNM44A00B24								

Ref No.	Part No.	Part Name & Description
<u>RESONATOR</u>		
X 701	QZE0049	Crystal
<u>COILS</u>		
L 1, 2	QLQX0332KWA	Peaking Coil
L 3, 4	QLQX0343KWA	Bias Trap Coil
L 5, 6	QLM9Z9K	MPX Filter
L 7	QLB0198KA	Bias Oscillation Coil
L 8	QLQX0332KWA	Peaking Coil
L 501	ELEH101KA	Choke Coil
L 502, 503	QLQZ1014D	Choke Coil
<u>TRANSFORMER</u>		
T 401	△ QLPD66EMX	AC Power Transformer
<u>FUSES</u>		
F 1, 2	△ XBAQ0008	Fuse (T630mA)
F 3	△ XBAQ125028	Fuse (T1.25A)
F 4, 5	△ XBAQ0006	Fuse (T315mA)
<u>SWITCHES</u>		
S 1	QSR8402	Rotary Switch (NR Selector)
S 401	△ QSW1117AS	Push Switch (Power ON/OFF)
S 402	△ QSR1407	Rotary Switch (Voltage Selector)
S 501, 502, 503, 504, 505, 506, 507, 508	QSW1118HA	Key Board Switch
S 509, 510, 511, 512	QSWY409	Push Switch
S 513	QSS1303	Slide Switch (Timer Switch)
S 601	QSB0260	Leaf Switch (Erase Safety Switch)
S 602	QSB0260	Leaf Switch (Mode Sensing Switch)
S 603	QSB0261	Leaf Switch (Stop Switch)
S 604	QSB0260	Leaf Switch (Playback Switch)
S 605	QSB0261	Leaf Switch (Half Detection Switch)
S 606, 607	QSB0266	Leaf Switch (Auto Tape Selector)
<u>JACKS</u>		
J 1	QJA0259	Headphones Jack
J 2	QJA0262	Microphone Jack

R SECTION

FL METER CIRCUIT BOARD



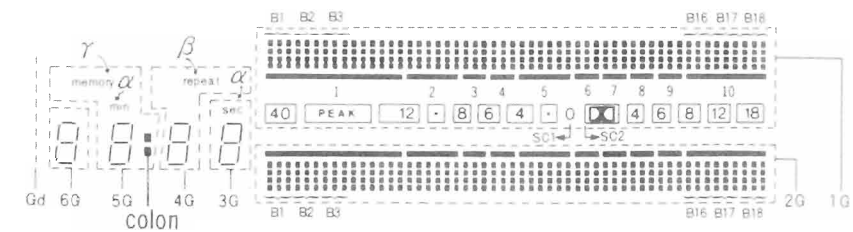
D301 - 303 QVD1S2473T
305, 306 [MA161]

D304 1S2473FV
[MA161]

Q303 2SB641(R,S)
[2SB641R]

Q304 2SA564(R,S,T)
[2SA564R]

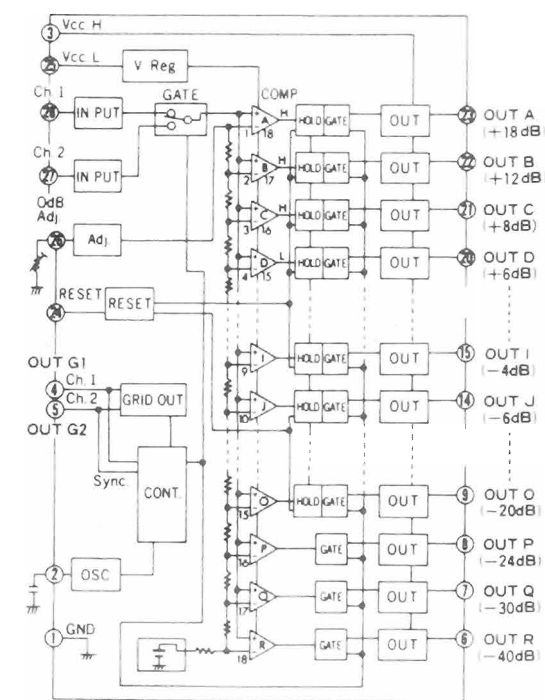
GRID TERMINATION (FL METER)



Digital Multi Counter (FL Meter)

EQUIVALENT CIRCUIT

IC 301 AN6870N

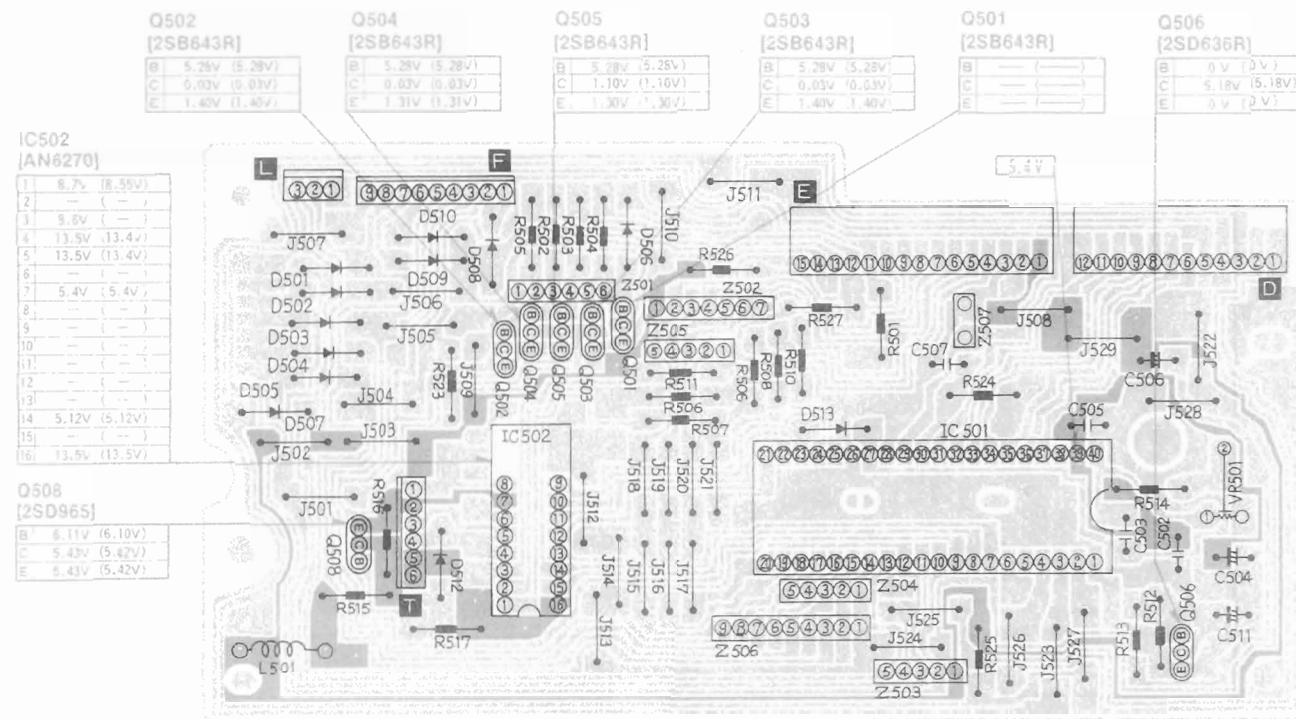


NOTES:

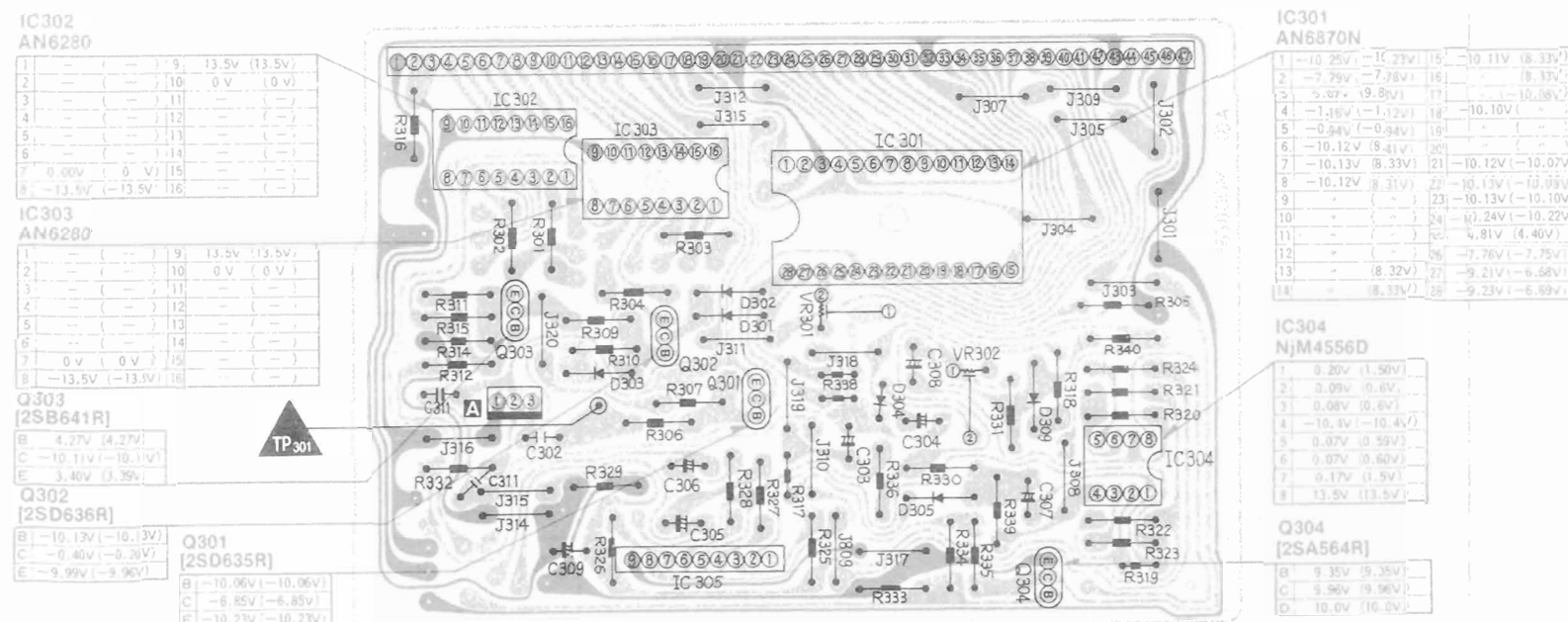
- VR301... FL meter adjustment VR (For 0 dB indication)
- VR302... FL meter adjustment VR (For -40 dB indication)
- VR501... Input scanning time adjustment VR
- S501... Counter reset switch
- S502... Pause switch
- S503... Record switch
- S504... Stop switch
- S505... Playback switch
- S506... Fast Forward switch
- S507... Rewind switch
- S508... Record mute switch
- S509... Memory repeat switch
- S510... Tape/Time select switch
- S511... Set switch
- S512... Music select switch
- S513... Timer switch (shown in REC position: (1) REC, (2) OFF, (3) PLAY)
- S601... Accidental erase prevention switch
- S602... Mode switch
- S603... Stop switch
- S604... Playback switch
- S605... Cassette detection switch
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000 (Ω), 1M = 1,000 k(Ω).
- Capacity are in microfarads (μ F) unless specified otherwise.
P = Pico-farads.
- The mark (▼) shows test point, e.g. ▼ = Test point 1.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position.
However, the voltage in record mode is indicated in () when it differs from that in record mode.
For measurement, use VTVM.
- (—) indicates B + (bias)
- (—) indicates B - (bias)
- (—) indicates the flow of the playback signal (dbx out)
- (—) indicates the flow of the recording signal (dbx out)
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors are diodes. One type of number is used for supply parts number and production parts number when they are identical.
e.g. Q1
2SC1844(E,F) ← Production parts number
[2SC1844E] ← Supply parts number
D301
QVD1S2473T ← Production parts number
[MA161] ← Supply parts
- The supply parts number is described alone in the replacement parts list.
- This schematic diagram may be modified at any time with the development of new technology.

CIRCUIT BOARDS

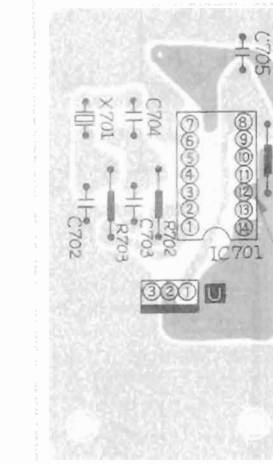
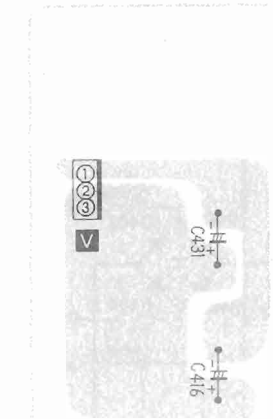
n MECHANISM CONTROL CIRCUIT BOARD



9 FL METER CIRCUIT BOARD



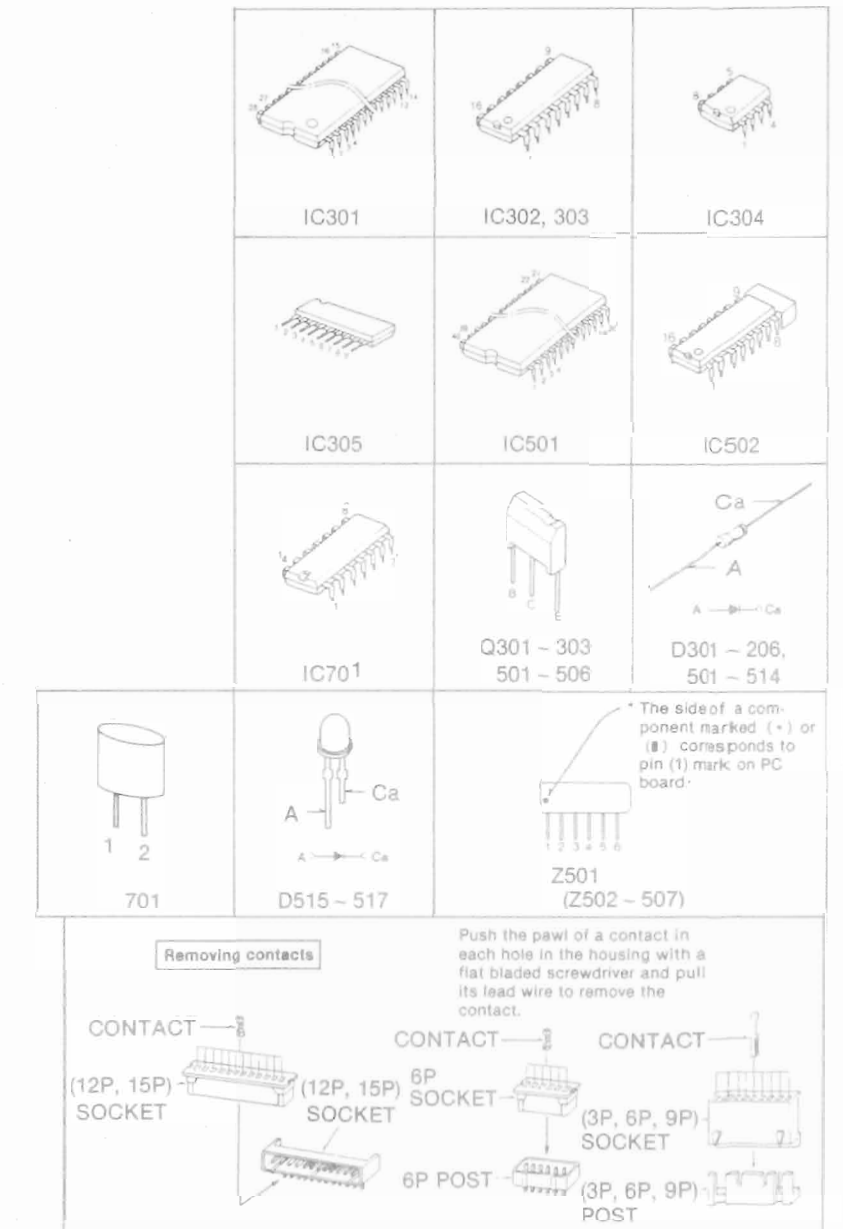
h QUARTZ CIRCUIT BOARD



IC701 [M54816P]

1	—	8	2.27V (2.27V)
2	0.72V (0.72V)	9	—
3	—	10	—
4	—	11	—
5	—	12	4.56V (4.57V)
6	0V (0V)	13	—
7	—	14	4.56V (4.57V)

TERMINATIONS

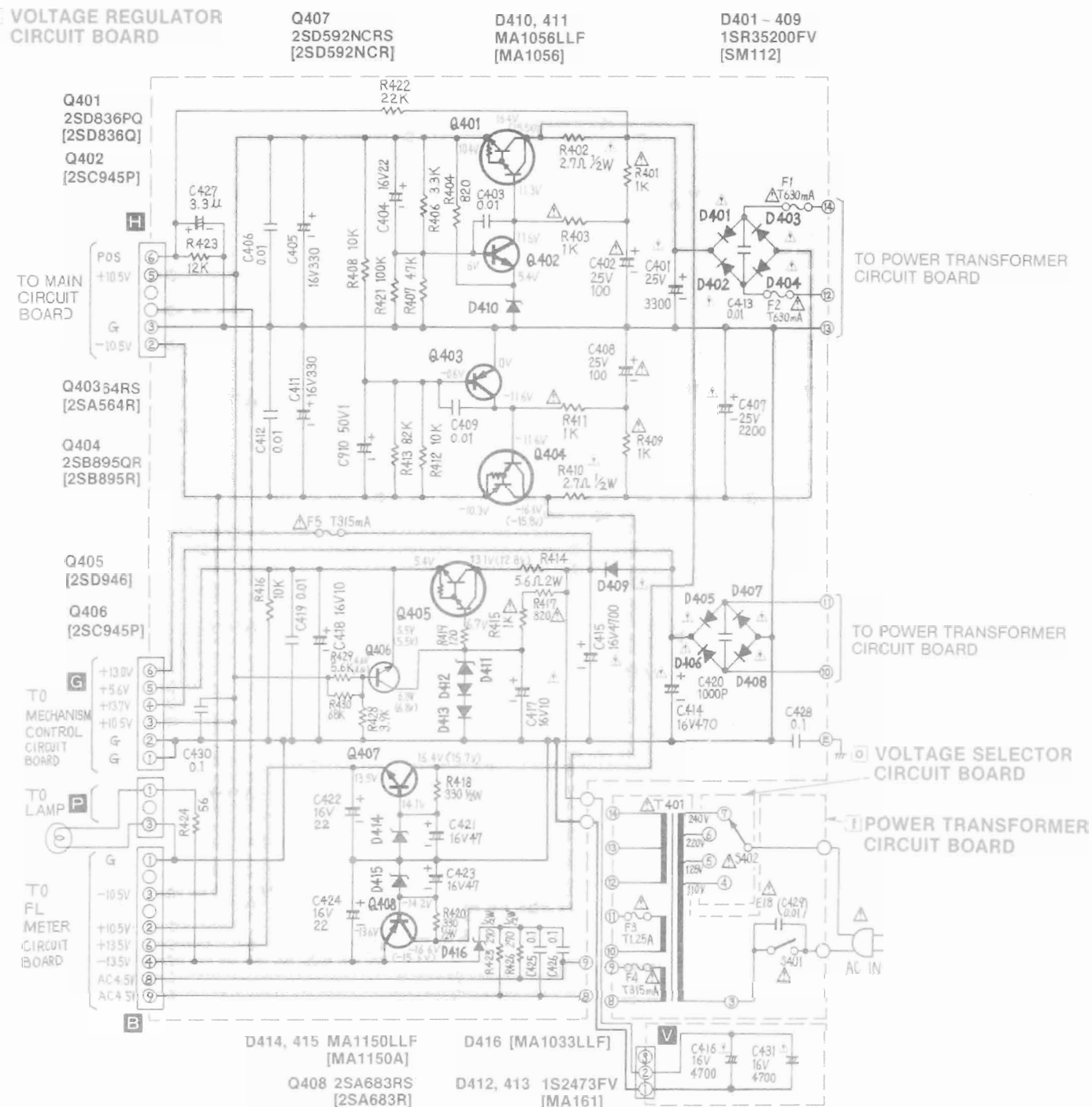


- NOTES:**
- The circuit shown in on the conductor is B + (bias) circuit.
 - The circuit shown in on the conductor is B - (bias) circuit.
 - Values indicated in are under no signal condition and playback mode with volume control at minimum position otherwise specified.
 - However, the voltage in record mode is indicated in ()
 - For measurement use VTVM
 - This circuit board diagram may be modified at any time with the development of new technology.

SCHEMATIC DIAGRAM

POWER SUPPLY SECTION

VOLTAGE REGULATOR CIRCUIT BOARD



NOTES:

- S401... Power ON/OFF switch
- S402... AC power voltage select switch
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise
- 1K = 1,000 (Ω), 1M = 1,000 k(Ω)
- Capacity are in microfarads (μ F) unless specified otherwise
- P = Pico-farads
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position. However, the voltage in record mode is indicated in ()
- For measurement use VTVM.
- (+B) indicates B + (bias).
- (-B) indicates B - (bias).

- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors are diodes. One type of number is used for supply parts number and production parts number when they are identical.

e.g. Q1

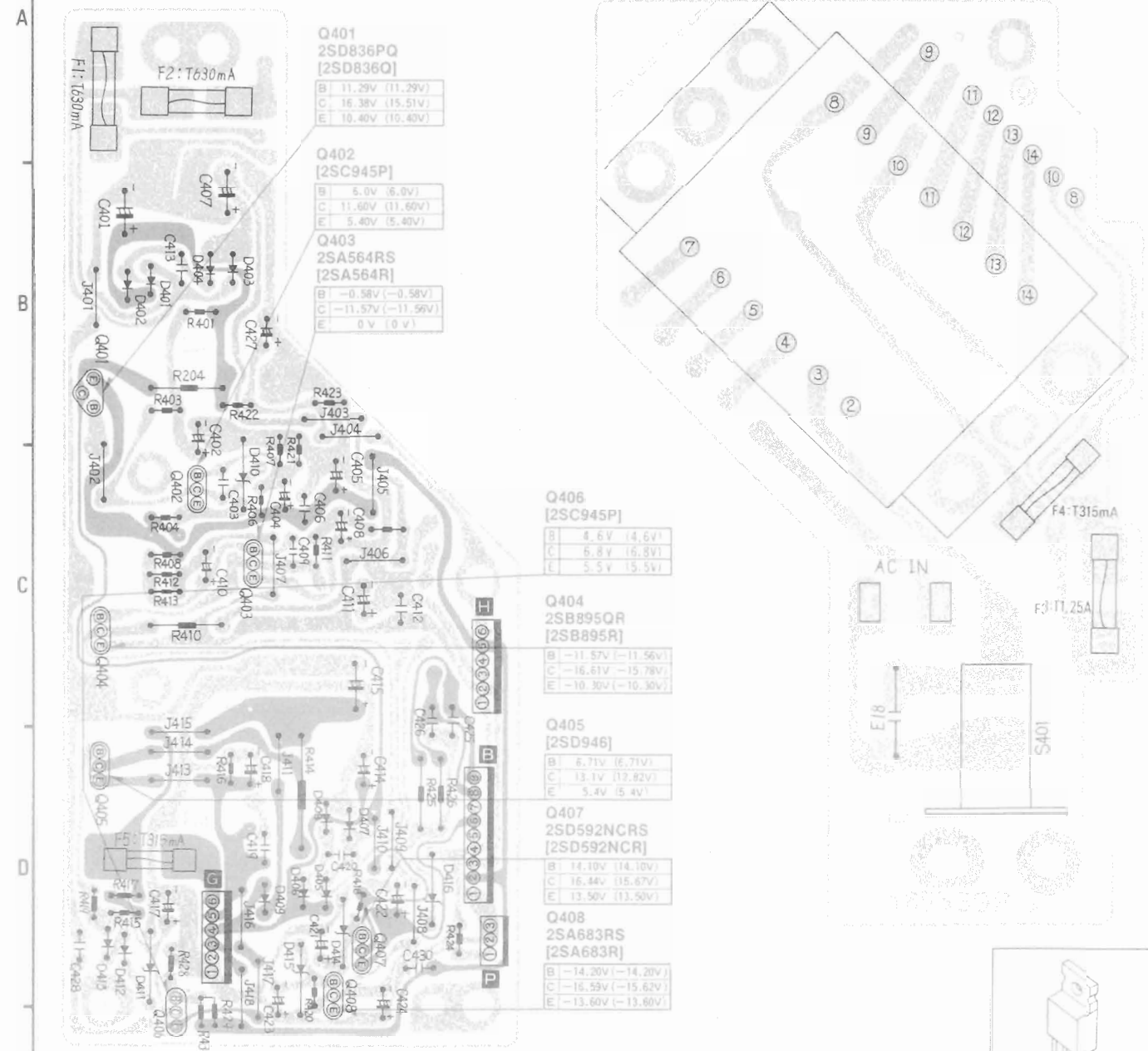
2SC1844(E,F) ← Production parts number
 [2SC1844E] ← Supply parts number
 D301
 QVD1S2473T ← Production parts number
 [MA161] ← Supply parts

- The supply parts number is described alone in the replacement parts list
- This schematic diagram may be modified at any time with the development of new technology.

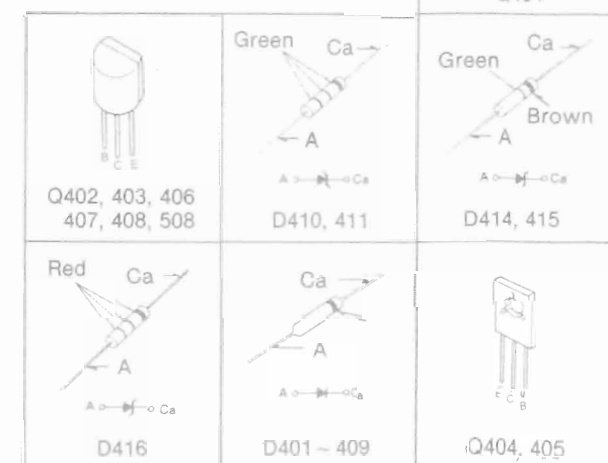
CIRCUIT BOARDS

POWER SUPPLY CIRCUIT BOARD

TRANSFORMER CIRCUIT BOARD



TERMINATIONS



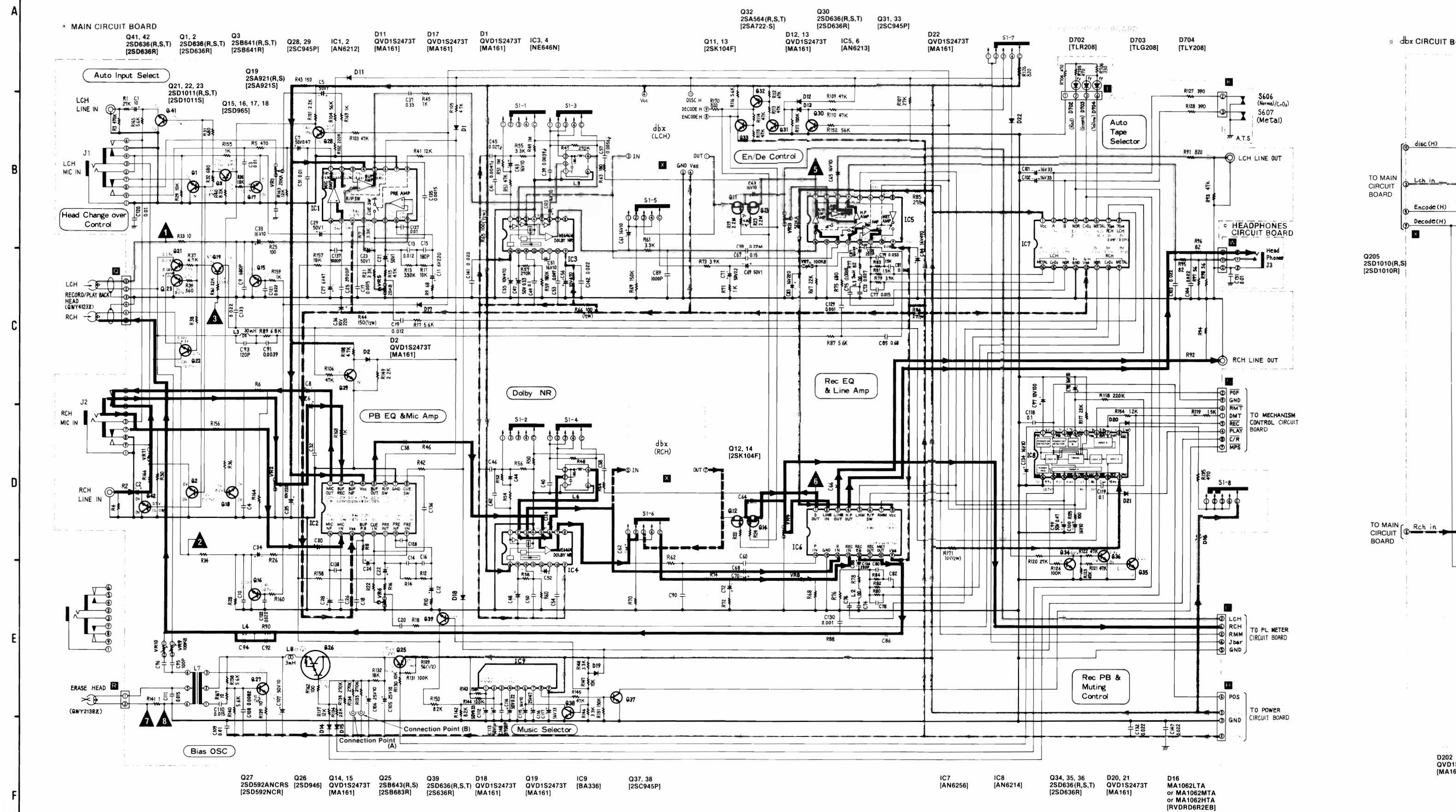
NOTES:

- The circuit shown in () on the conductor is +B (bias) circuit.
- The circuit shown in () on the conductor is -B (bias) circuit.
- The circuit shown in () on the conductor side indicates printed circuit on the back side of the printed circuit board.
- Values indicated in () are DC voltage between the ground and electrical parts.
- The voltage indicates are measured during playback mode. However, the voltage in record mode is indicated in () when it differs from that in record mode.

- This circuit board diagram may be modified at any time with the development of new technology.

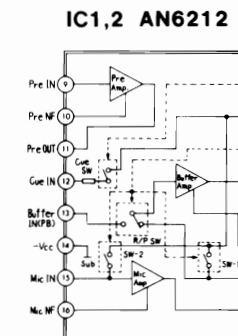
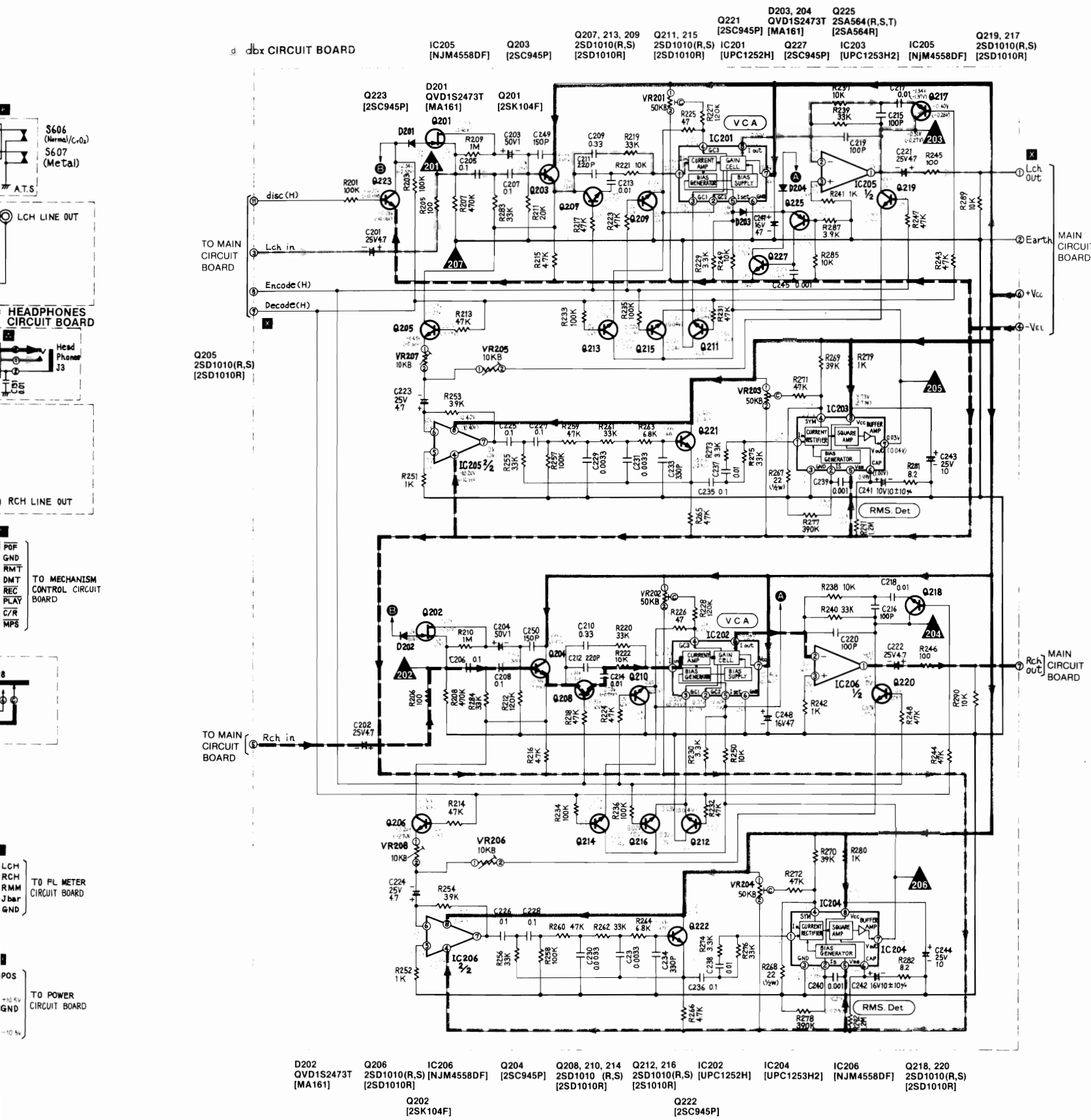
SCHEMATIC DIAGRAM MAIN SECTION

dbx SEC



dbx SECTION

EQUIVALENT CIRCUITS

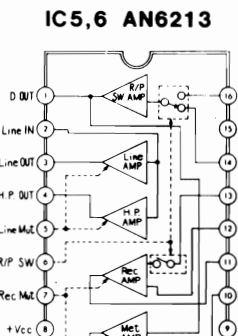


■ Truth table of IC1, 2 (Postive)

R / P SW	
H	REC
L	PB

SW-1, SW-2	
H	
L	Mute

Cue SW	
H	
L	Cue

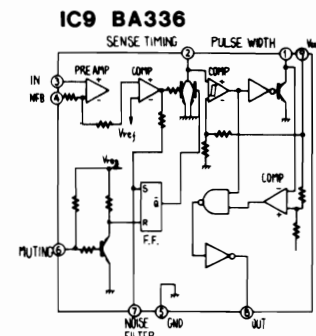
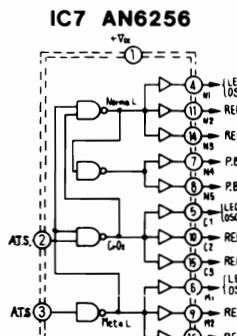


■ Truth table of IC5, 6 (Positive)

R / P SW	
H	REC
L	PB

Muting	
H	Muting OFF
L	Muting ON

L : GND Level



- NOTES:
- S1-1 ~ S1-8 NR select switch (shown in OUT position: (1) Dolby NR, (2) OUT, (3) dbx tape, (4) dbx disc)
 - S606 Auto tape select switch (For Normal/CrO₂ tape)
 - S607 Auto tape select switch (For Metal tape)

Mode	S606	S607
Normal	on	on
CrO ₂	on	off
Metal	off	off

- VR1, 2 Input level controls.
- VR3, 4 Output level control.
- VR5, 6 Playback gain adjustment VR.
- VR7, 8 Recording gain adjustment VR.
- VR9, 10 Bias current adjustment VR.
- VR201, 202 VCA symmetry adjustment VR.
- VR203, 204 RMS detector adjustment VR.
- VR205, 206 dbx standard level adjustment VR (Encode).
- VR207, 208 dbx standard level adjustment VR (Decode).
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000 (Ω), 1M = 1,000 k (Ω)
- Capacity are in microfarads (μF) unless specified otherwise.
P = Pico-farads.
- The mark (▽) shows test point. e.g. ▽ = test point 1.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position otherwise specified
 - Voltage values shown in MAIN SECTION.
NO MARK Voltage values at out (NR select switch) mode
..... Voltage values at record mode.
 - Voltage values shown in dbx SECTION.
..... Voltage values at out (NR select switch) mode.
..... Voltage values at disc (NR select switch) mode.
For measurement use VTVM.

SPECIFICATIONS

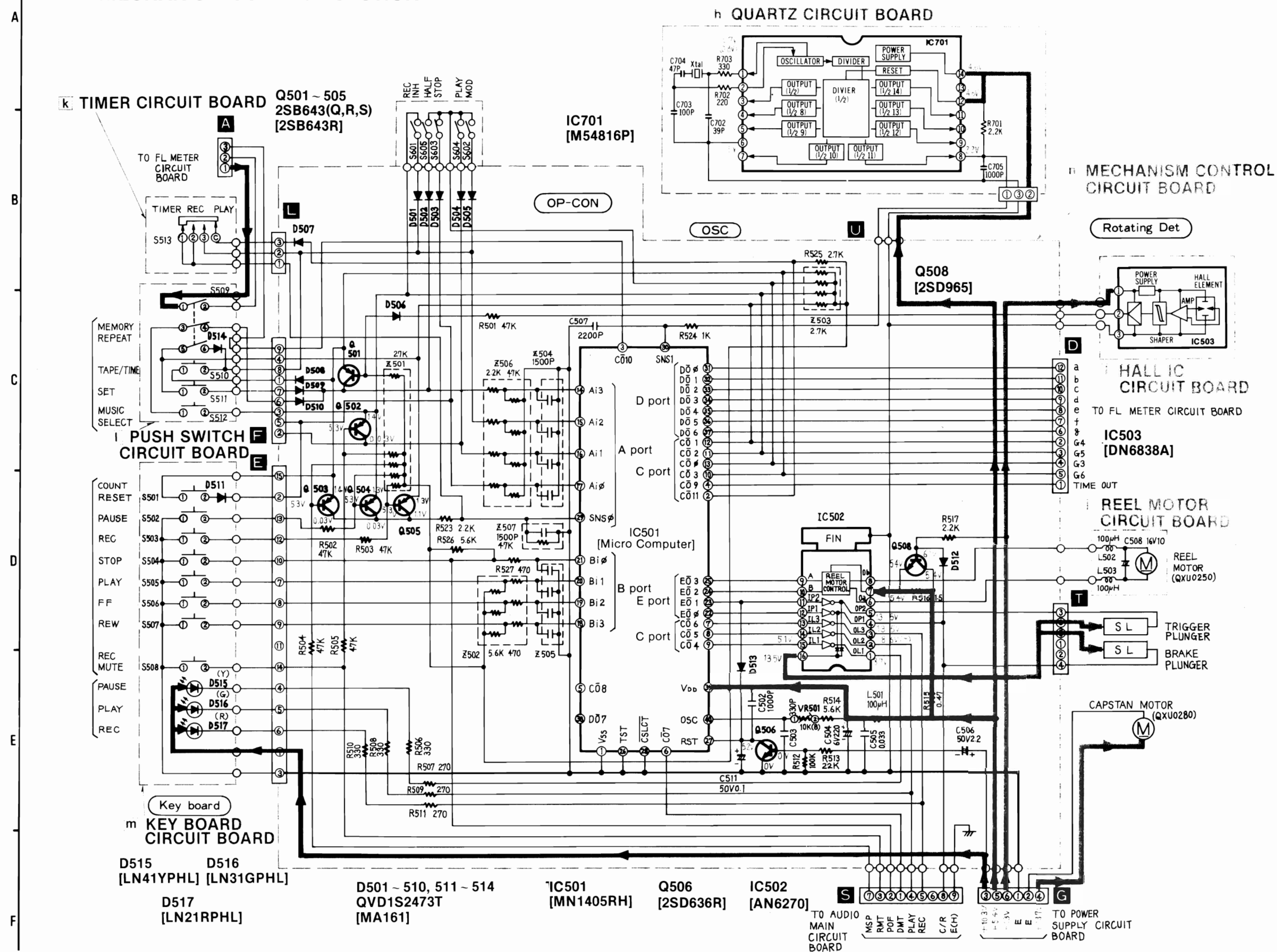
Playback S/N ratio • Test tape ... QZZCFM	Greater than 45 dB
Overall distortion • Test tape ... QZZCRA for Normal ... QZZCRX for CrO ₂ ... QZZCRZ for Metal	Less than 4 %
Overall S/N ratio • Test tape ... QZZCRA	Greater than 43 dB (without NAB filter)

- (→) Indicates B + (bias).
- (=) Indicates B - (bias).
- (→) Indicates the flow of the playback signal (dbx out).
- (→) Indicates the flow of the playback signal (dbx tape).
- (→) Indicates the flow of the recording signal (dbx out).
- (→) Indicates the flow of the recording signal (dbx tape).
- The supply parts number is described alone in the replacement parts list.
- This schematic diagram may be modified at any time with the development of new technology.

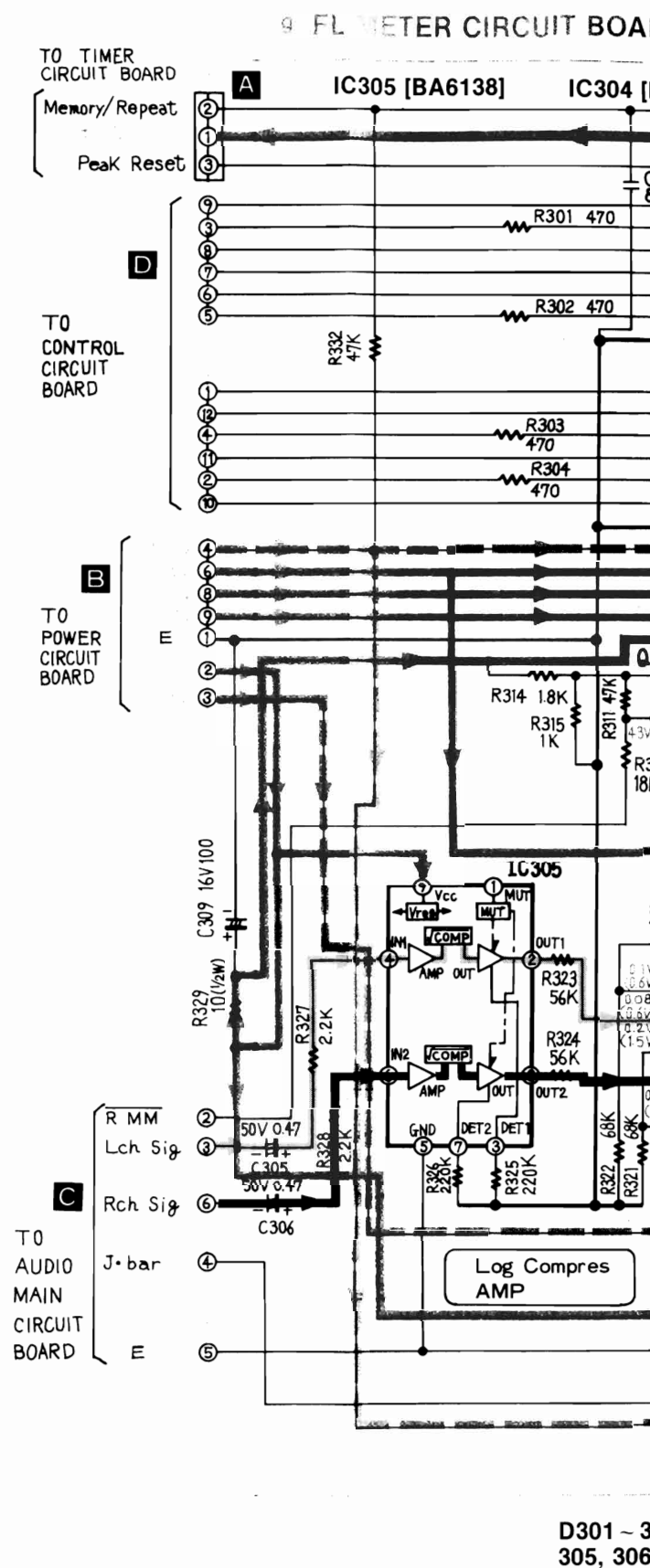
— 42 —

SCHEMATIC DIAGRAM

MECHANISM CONTROL SECTION

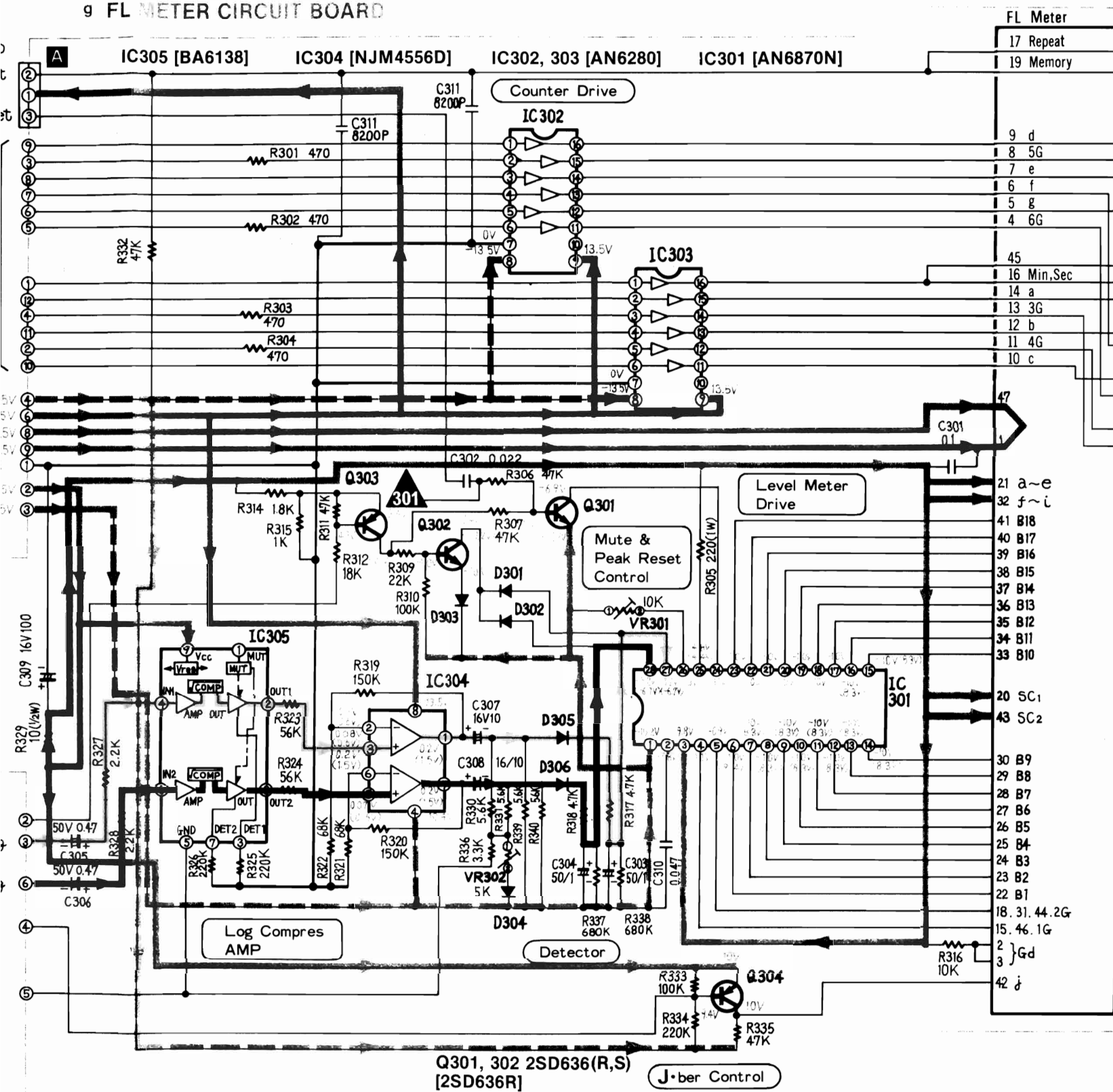


FL METER SECTION



FR SECTION

9 FL METER CIRCUIT BOARD



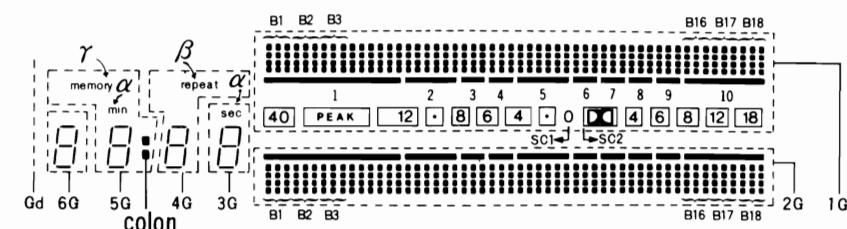
D301 ~ 303 QVD1S2473T
305, 306 [MA161]

D304 1S2473FV
[MA161]

Q303 2SB641(R,S)
[2SB641R]

Q304 2SA564(R,S,T)
[2SA564R]

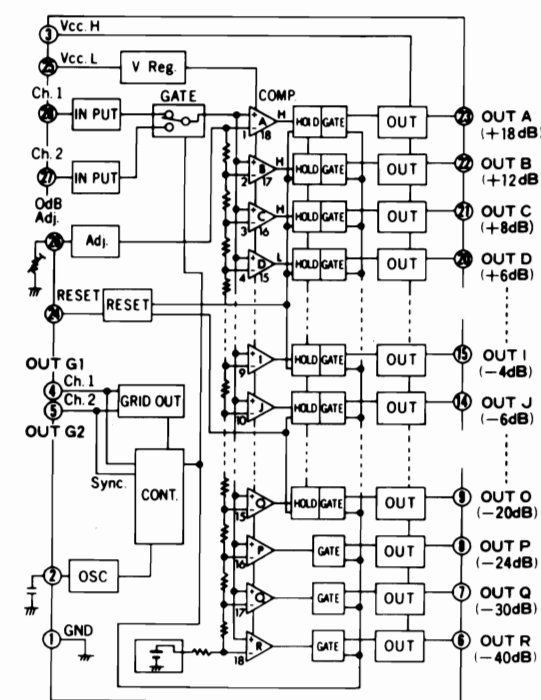
GRID TERMINATION (FL METER)



Digital Multi Counter (FL Meter)

EQUIVALENT CIRCUIT

IC301 AN6870N

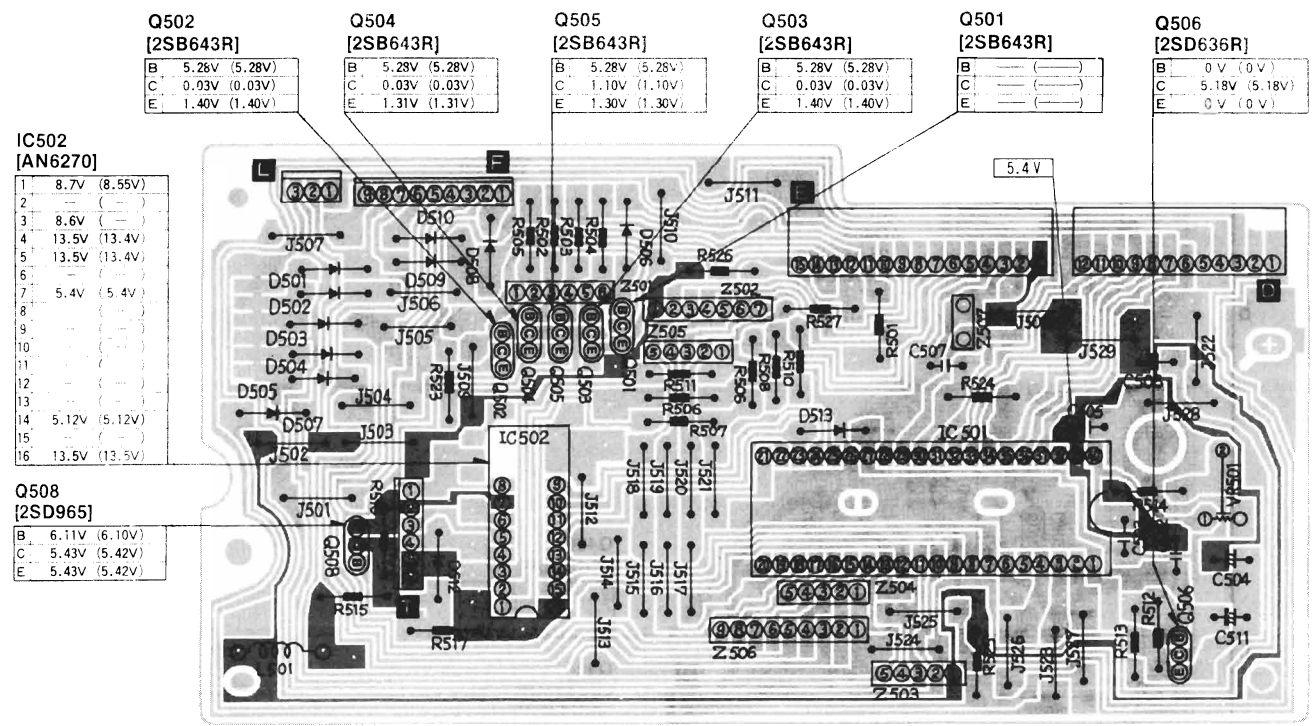


NOTES:

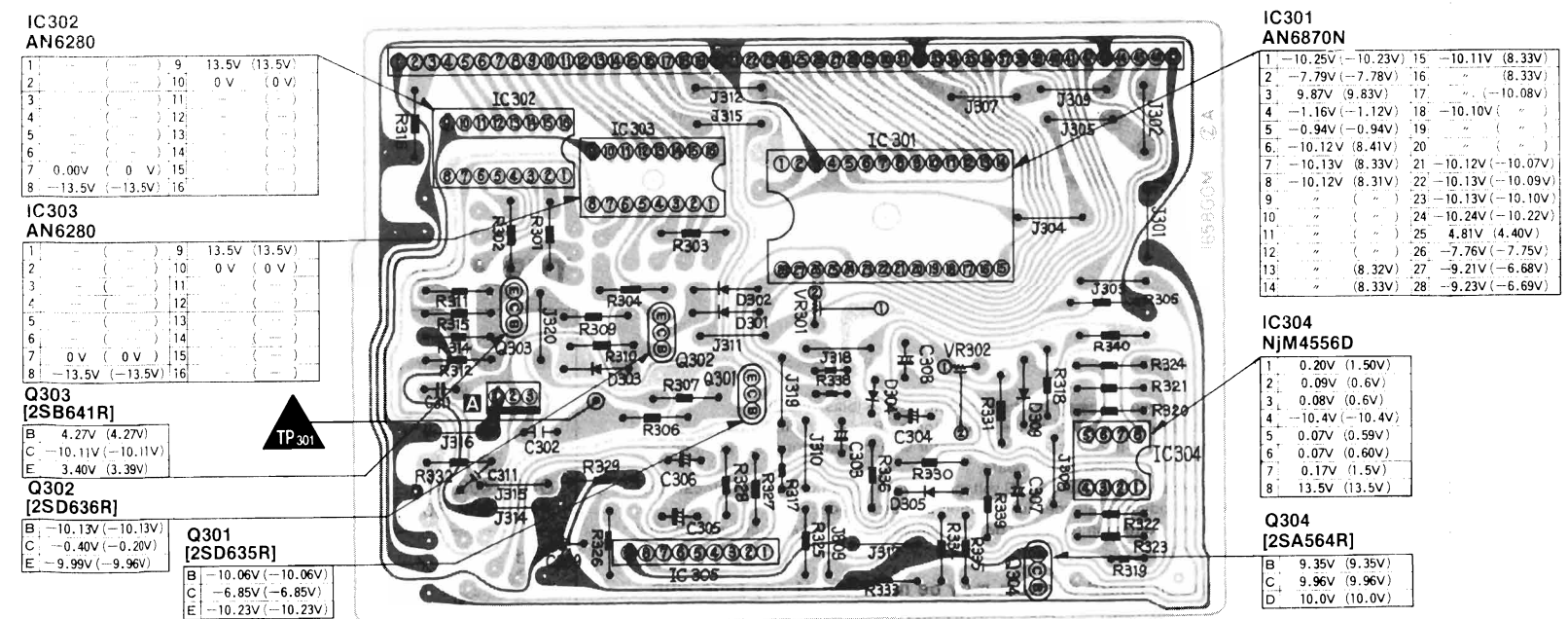
- VR301... FL meter adjustment VR (For 0 dB indication)
- VR302... FL meter adjustment VR (For -40 dB indication)
- VR501... Input scanning time adjustment VR
- S501... Counter reset switch
- S502... Pause switch
- S503... Record switch
- S504... Stop switch
- S505... Playback switch
- S506... Fast Forward switch
- S507... Rewind switch
- S508... Record mute switch
- S509... Memory repeat switch
- S510... Tape/Time select switch
- S511... Set switch
- S512... Music select switch
- S513... Timer switch (shown in REC position: (1) REC, (2) OFF, (3) PLAY)
- S601... Accidental erase prevention switch
- S602... Mode switch
- S603... Stop switch
- S604... Playback switch
- S605... Cassette detection switch
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000 (Ω), 1M = 1,000 k(Ω).
- Capacity are in microfarads (μ F) unless specified otherwise.
P = Pico-farads.
- The mark (▼) shows test point. e.g. ▼ = Test point 1.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position. However, the voltage in record mode is indicated in () when it differs from that in record mode.
- For measurement, use VTVM.
- (—) indicates B + (bias)
- (—) indicates B - (bias)
- (—) indicates the flow of the playback signal (dbx out)
- (—) indicates the flow of the recording signal (dbx out)
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors are diodes. One type of number is used for supply parts number and production parts number when they are identical.
- e.g. Q1
2SC1844(E,F) ← Production parts number
[2SC1844E] ← Supply parts number
D301
QVD1S2473T ← Production parts number
[MA161] ← Supply parts
- The supply parts number is described alone in the replacement parts list.
- This schematic diagram may be modified at any time with the development of new technology.

CIRCUIT BOARDS

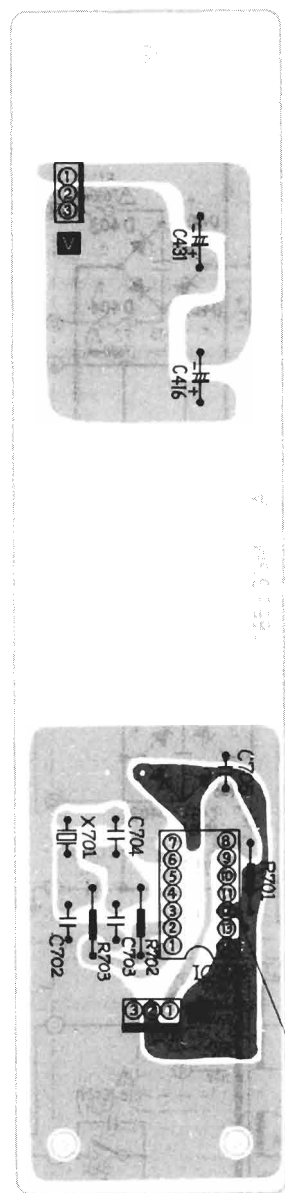
n MECHANISM CONTROL CIRCUIT BOARD



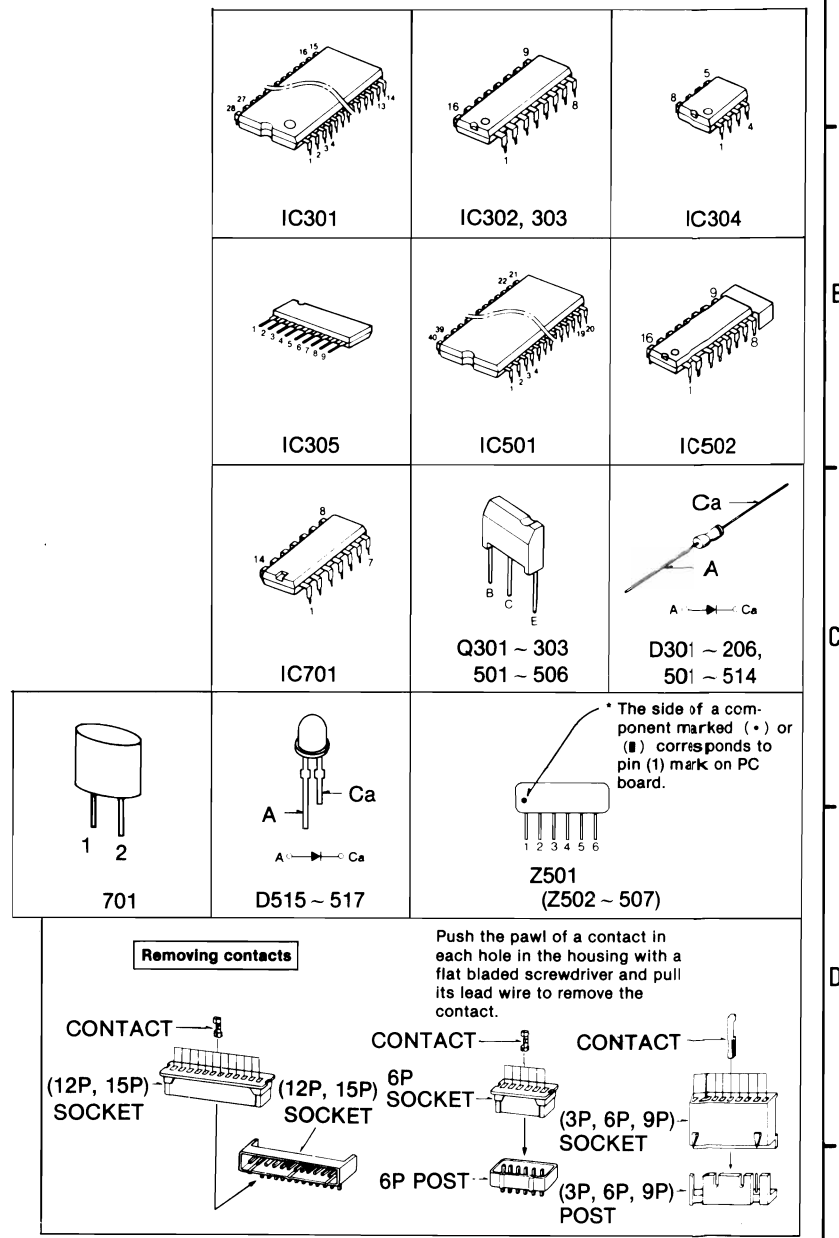
9 FL METER CIRCUIT BOARD



h QUARTZ CIRCUIT BOARD



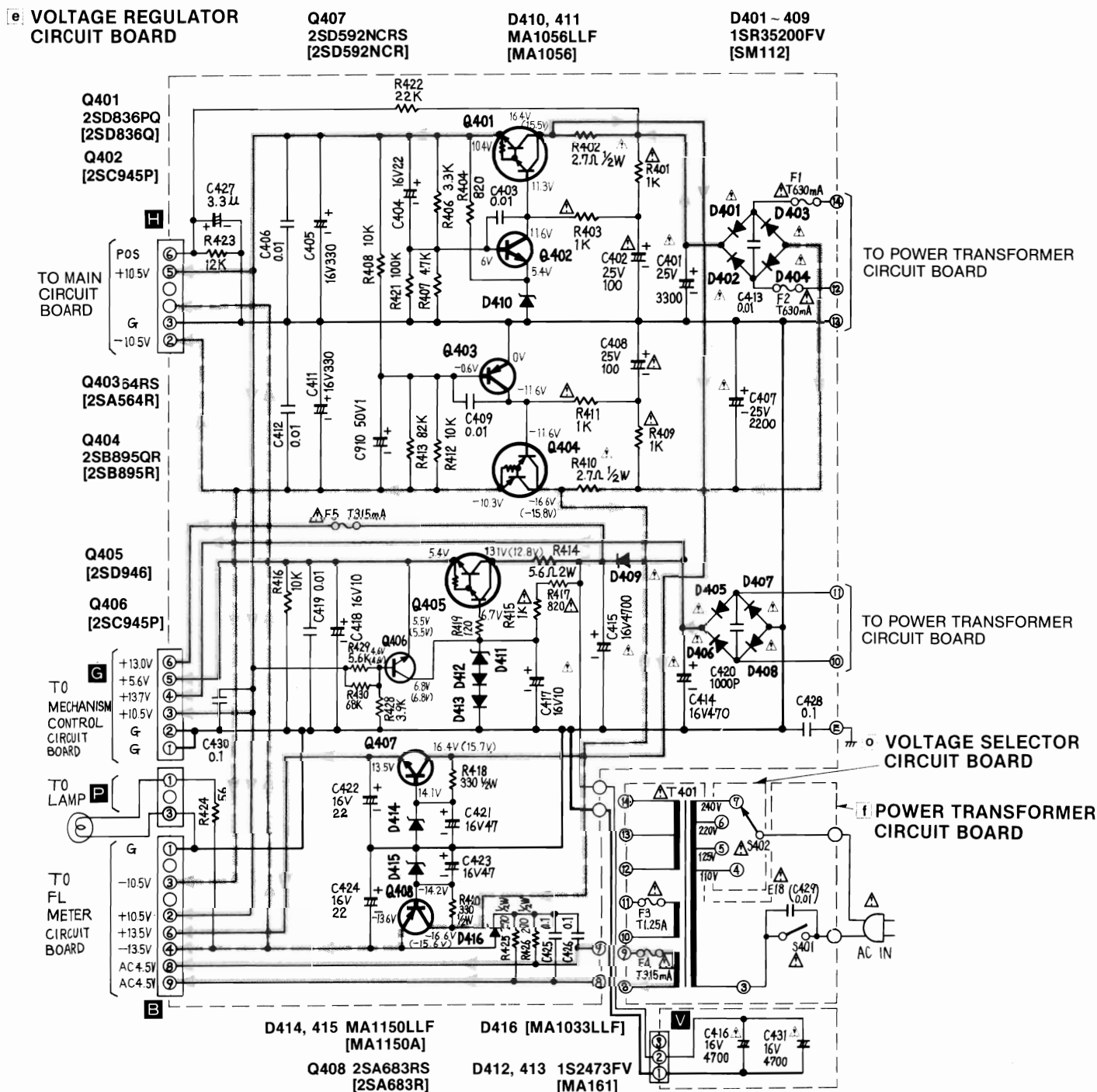
TERMINATIONS



NOTES:
• The circuit shown in [diagram] on the conductor is B + (bias) circuit.
• The circuit shown in [diagram] on the conductor is B - (bias) circuit.
• Values indicated in [diagram] are under no signal condition and playback mode with volume control at minimum position otherwise specified.
• However, the voltage in record mode is indicated in ()
• For measurement use VTVM
• This circuit board diagram may be modified at any time with the development of new technology.

SCHEMATIC DIAGRAM

POWER SUPPLY SECTION

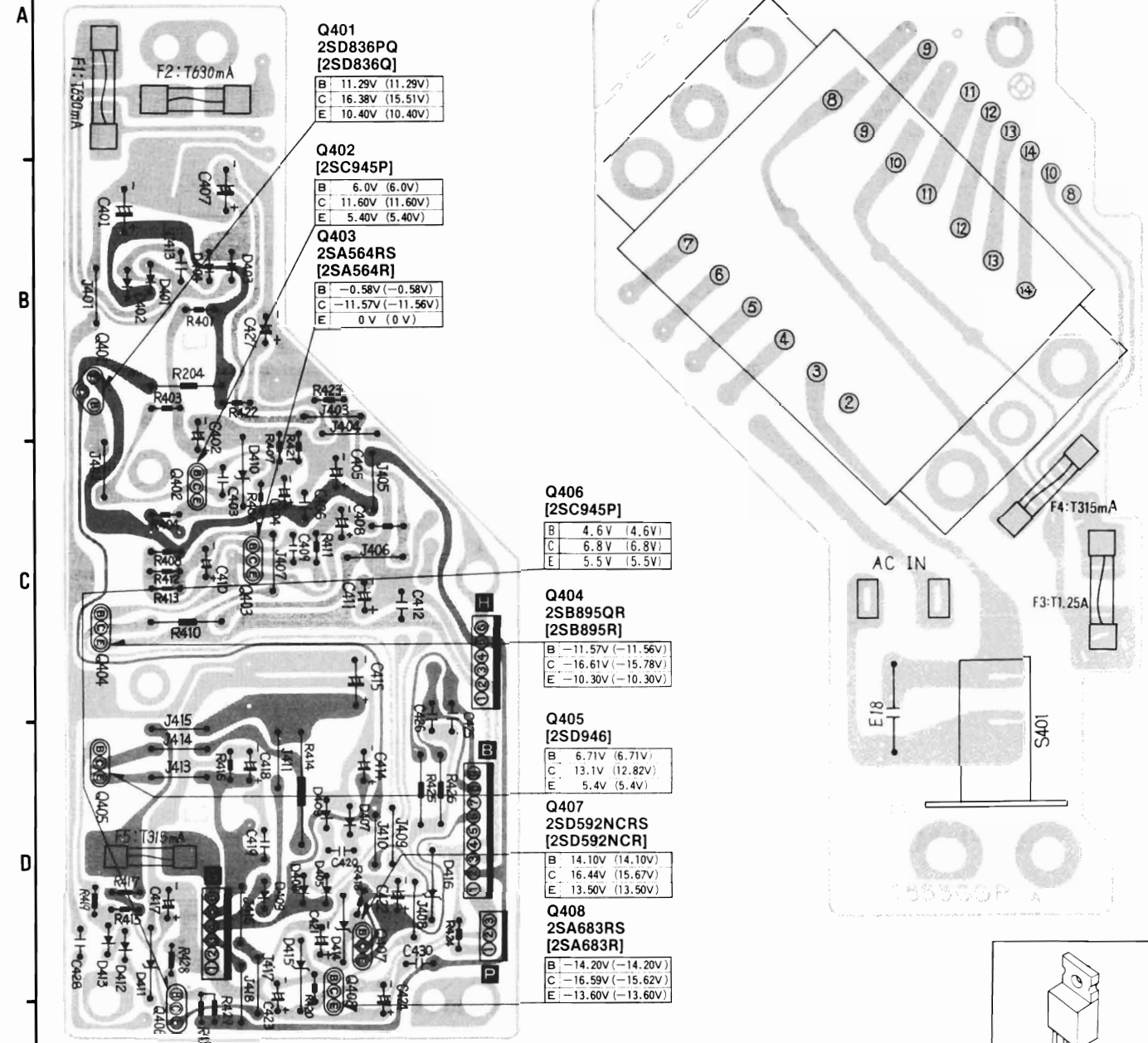


- NOTES:**
- S401.... Power ON/OFF switch.
 - S402.... AC power voltage select switch
 - Resistance are in ohms (Ω), 1/4 watt unless specified otherwise.
1K = 1,000 (Ω), 1M = 1,000 k(Ω).
 - Capacity are in microfarads (μ F) unless specified otherwise.
P = Pico-farads.
 - All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position.
However, the voltage in record mode is indicated in ().
For measurement use VTVM.
 - () indicates B + (bias).
 - () indicates B - (bias).

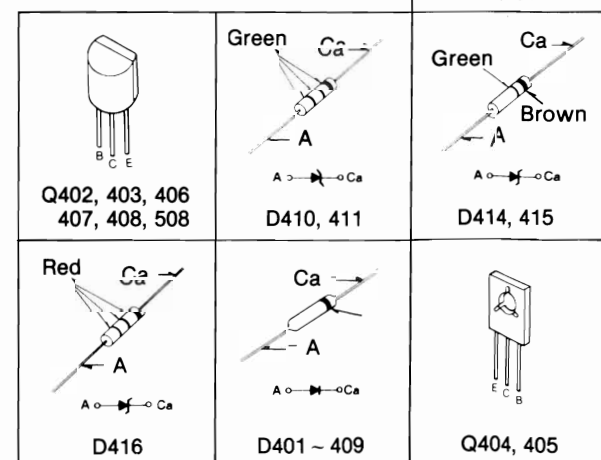
- Described in the schematic diagram are two types of numbers; the supply parts number and production parts number for transistors are diodes. One type of number is used for supply parts number and production parts number when they are identical.
 - e.g. Q1
 2SC1844(E,F) ◀—Production parts number
 [2SC1844E] ◀—Supply parts number
 D301
 QVD1S2473T ◀—Production parts number
 [MA161] ◀—Supply parts
- The supply parts number is described alone in the replacement parts list.
- **This schematic diagram may be modified at any time with the development of new technology.**

CIRCUIT BOARDS

POWER SUPPLY CIRCUIT BOARD TRANSFORMER CIRCUIT BOARD



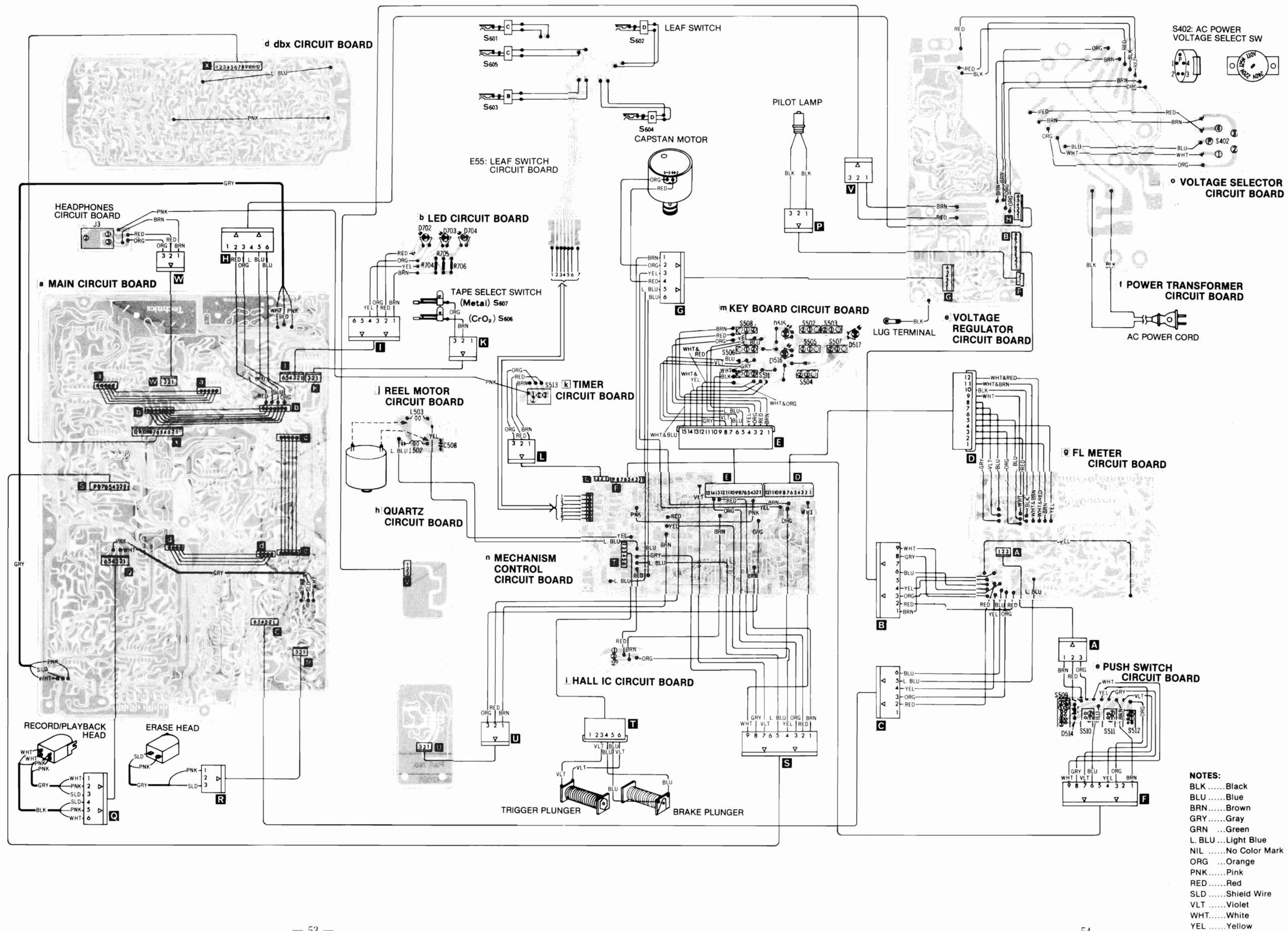
TERMINATIONS

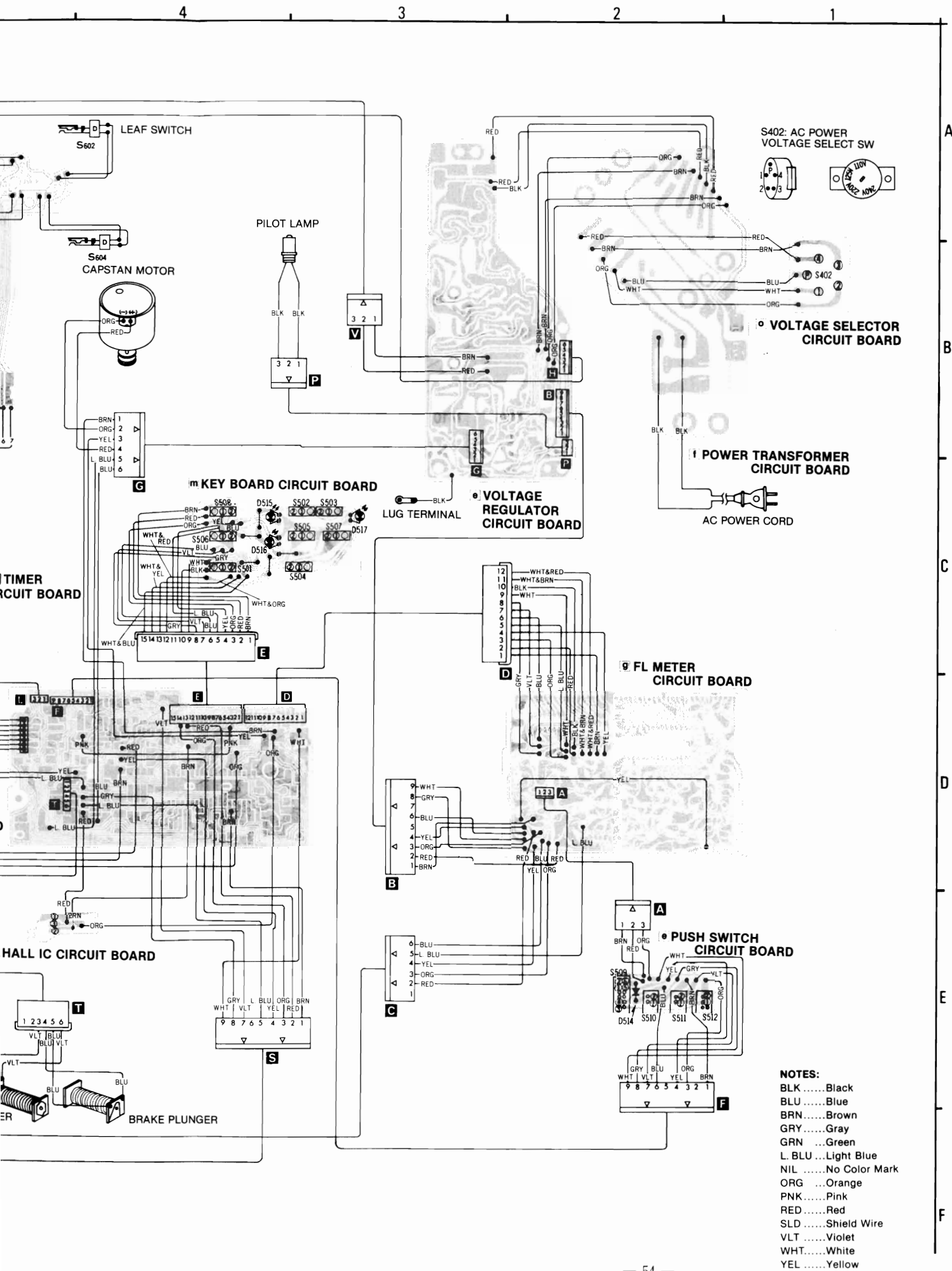


- NOTES:**
- The circuit shown in  on the conductor is + B (bias) circuit.
 - The circuit shown in  on the conductor is - B (bias) circuit.
 - The circuit shown in  on the conductor side indicates printed circuit on the back side of the printed circuit board.
 - Values indicated in  are DC voltage between the ground and electrical parts.
 - The voltage indicates are measured during playback mode.
- However, the voltage in record mode is indicates in () when it differs from that in record mode.

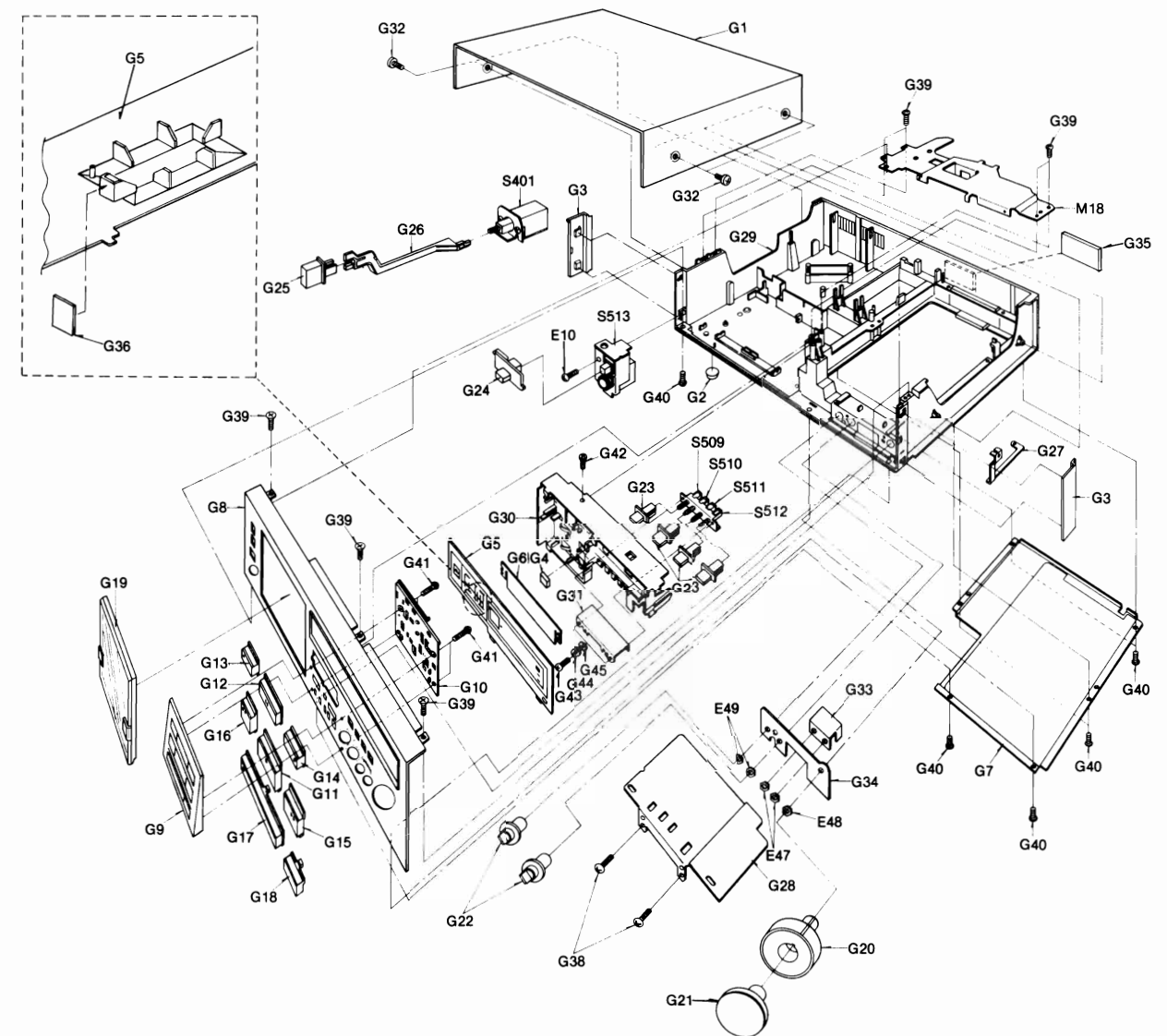
- This circuit board diagram may be modified at any time with the development of new technology.

WIRING CONNECTION DIAGRAM





CABINET PARTS LOCATION



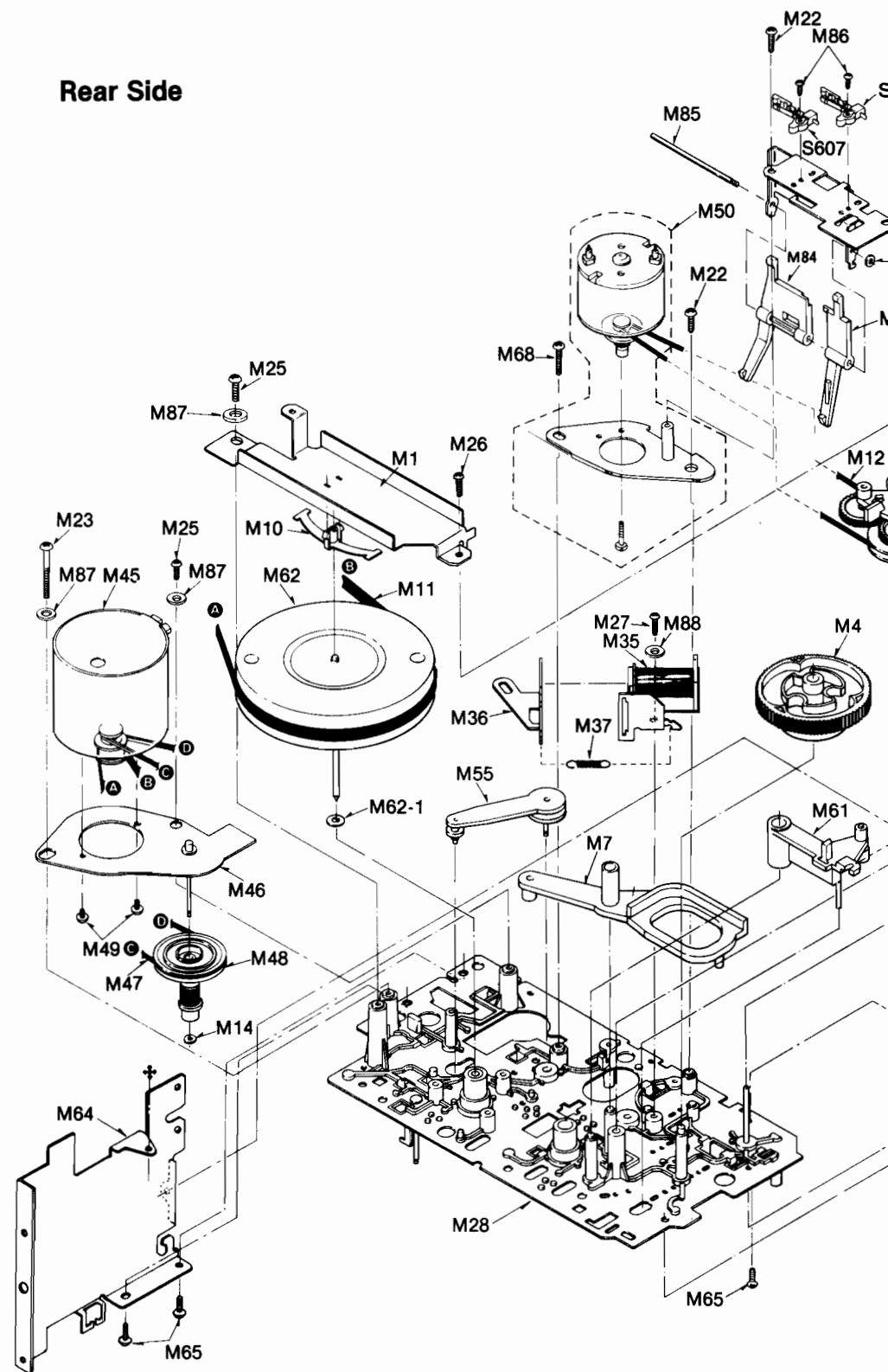
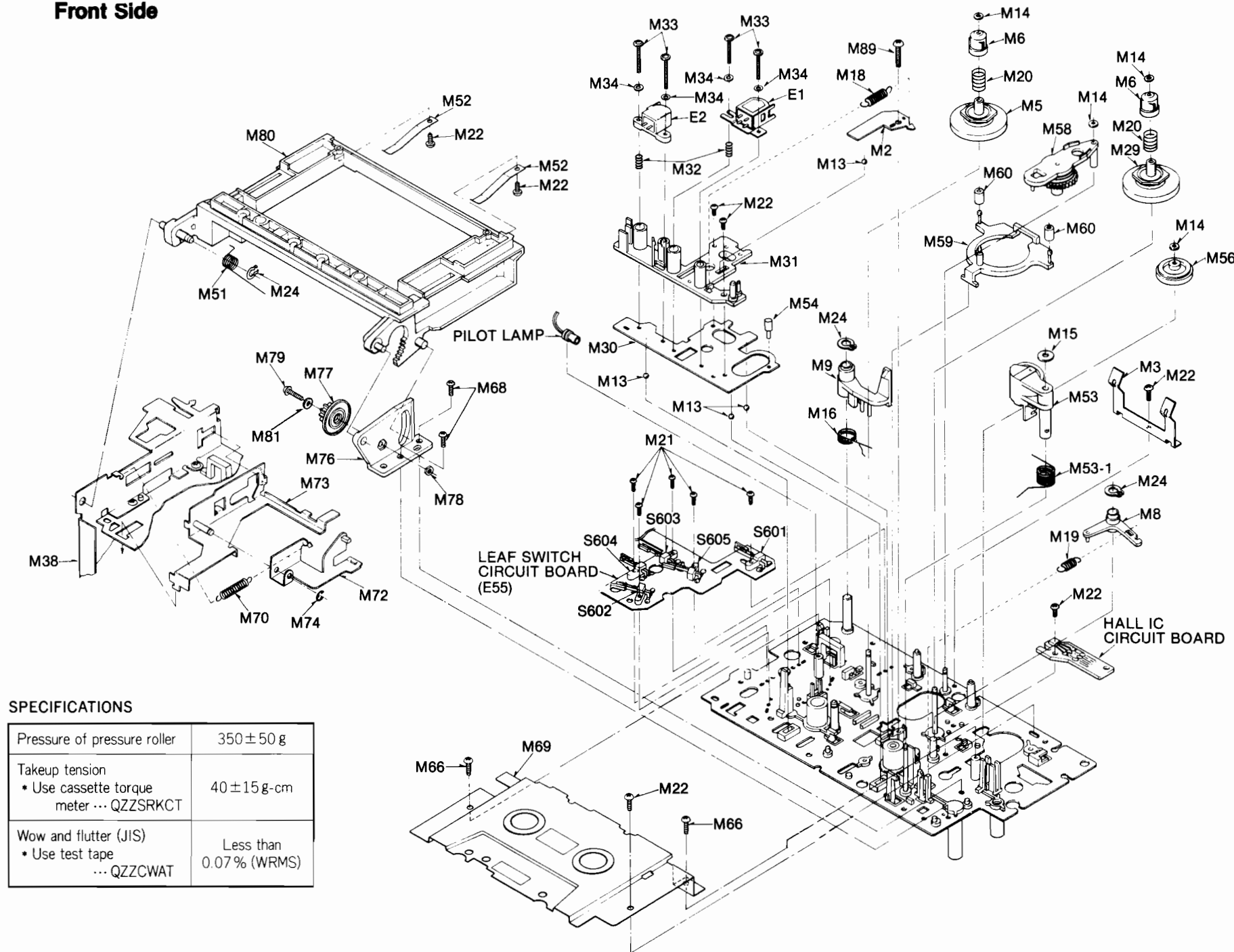
REPLACEMENT PARTS LIST

Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description
CABINET PARTS								
G 1	QGC0058	Case Cover	G 15	QGO1990Y	Operation Button (Rec Mute)	G 31	QTW1279	Meter Insulating Plate
	"Silver Type"			"Black Type"		G 32	XTB4 + 8BFN	Screw ④4×8
	QGC0058K	Case Cover		QGO1991	Operation Button (Fast Forward)		"Silver Type"	
	"Black Type"			"Silver Type"			XTB4 + 8BFZ	Screw ④4×8
G 2	QKA1086	Case Foot		QGO 1991Y	Operation Button (Fast Forward)	G 33	QTS1575	Microphone Shield Plate
G 3	QKG3201	Side Board	G 16	QGO1993	Operation Button (Rewind)	G 34	QMA4363	Volume Angle
	"Silver Type"			"Silver Type"		G 35	[B] QGS2975	Main Name Plate
	QKG3201K	Side Board		"Black Type"			[For United Kingdom.]	
G 4	QBG1736	P.B Cushion	G 17	QGO1994	Operation Button (Stop)	G 36	QBH2012	Cover Cushion
G 5	QKG3223D	Meter Cover		"Silver Type"		G 38	XTN3 + 10B	Tapping Screw
	"Silver Type"			QGO1994Y	Operation Button (Stop)	G 39	XTS3 + 12B	Tapping Screw
	QKG3223K	Meter Cover		"Black Type"		G 40	XTN3 + 10B	Tapping Screw
G 6	QGL1174	Filter	G 18	QGO1995	Push Button (Counter Reset)	ACCESSORIES		
G 7	QYB0411	Button Cover Assembly	G 19	QYF0542	Cassette Lid Assembly	A 1	RP023A	Connection Card
G 8	QYP1084	Front Panel Assembly		"Silver Type"		A 2	[D] QQT3217	Instruction Book
	"Silver Type"			QYF0542K	Cassette Lid Assembly		[For all European areas except United Kingdom.]	
	QYP1085	Front Panel Assembly		"Black Type"			[B] QQT3218	Instruction Book
	"Black Type"		G 20	QYT0636	Volume Knob-R		[For United Kingdom.]	
G 9	QKG3222B	Operation Panel	G 21	QYT0637	Volume Knob-L	PACKINGS		
	"Silver Type"		G 22	QGT1569	Select Knob	P 1	QPN4290	Inside Carton
	QKG3222K	Operation Panel	G 23	QGO2043	Function Button	P 2	QPA0654	Cushion-A
	"Black Type"		G 24	QGO2042	Timer Button	P 3	QPA0655	Cushion-B
G 10	QKJ0518	Push Button Holder	G 25	QGO1900	Power Button	P 4	XZB50X65A02	Poly Bag
G 11	QXB0758	Operation Button (Play)	G 26	QMR1986	Power Rod	P 5	QPS0618	Pad
G 12	QXB0759	Operation Button (Pause)	G 27	QJC0049	Earth Plate-A	P 6	QPC0072	Sheet
G 13	QXB0760	Operation Button (Record)	G 28	QTS1579	Shield Plate	P 7	QPA0662	Spacer
G 14	QGO1990	Operation Button (Rec-Mute)	G 28	QTS1576	Meter Shield Plate			
	"Silver Type"		G 29	QKM1512	Main Case Assembly			
			G 30	QMK1959	Sub Chassis			

MECHANISM PARTS LOCATION

Front Side

Rear Side

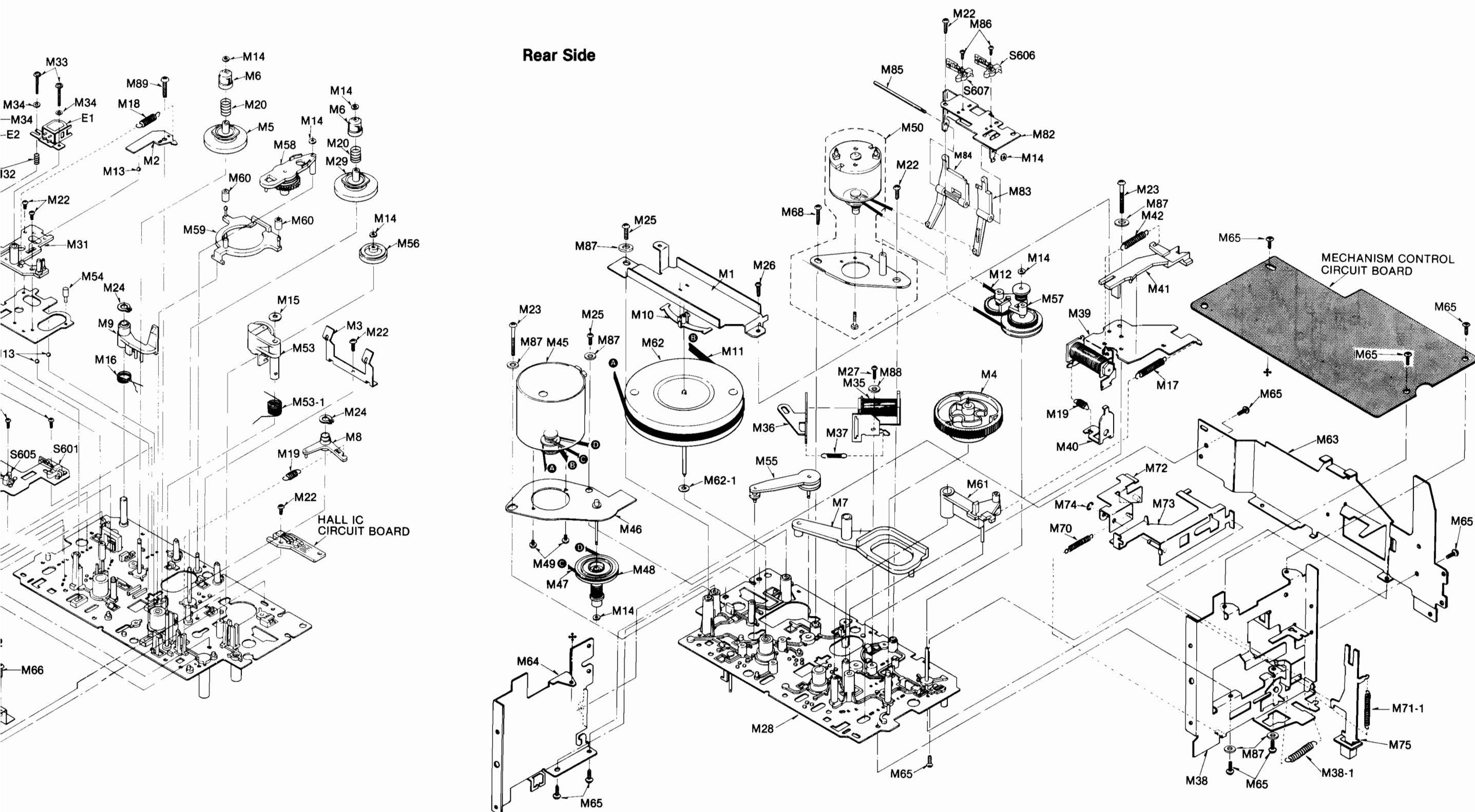


SPECIFICATIONS

Pressure of pressure roller	350±50 g
Takeup tension • Use cassette torque meter ... QZZSRKCT	40±15 g·cm
Wow and flutter (JIS) • Use test tape ... QZZCWAT	Less than 0.07 % (WRMS)

REPLACEMENT PARTS LIST

Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description
MECHANICAL PARTS			M 13	QDK1012	Steel Ball	M 27	XTN26 + 8B	Tapping Screw	M 41	QML3653	Control Lever	M 56	QX10116	Takeup Idler	M 69	QXH0390	Mechanism Cover
M 1	QMA4330	Flywheel Retainer	M 14	QBW2008	Snap Washer	M 29	QXD0120	Takeup Reel Table Assembly	M 42	QBT1278	Record Lock Lever Spring	M 57	QXL1408	Swing Gear Lever Assembly		"Silver Type"	Mechanism Cover
M 2	QBP1894	Head Base Plate Spring	M 15	QBW2046	Snap Washer	M 30	QMK1867	Head Base Plate	M 45	QXU0280	Capstan Motor Assembly	M 58	QXL1409	Fast Wind Arm Assembly		QXH0390K	Mechanism Cover
M 3	QBP1895	Cassette Pressure Spring	M 16	QBN1772	Erase Safety Lever Spring	M 31	QMZ1252	Head Spacer	M 46	QXA1077	Motor Retainer Assembly	M 59	QML3659	Brake Lever		"Black Type"	
M 4	QXG1059	Main Gear	M 17	QBT1725	Lock Lever Spring				M 47	QDB0286	Takeup Belt	M 60	QBG1132	Brake Rubber	M 70	QBT1691	Lamp Lever Spring-B
M 5	QDR1146	Supply Reel Table	M 18	QBT1927	Head Base Plate Spring	M 32	QBC1103	Head Spring	M 48	QXP0621	Takeup Pulley						
M 6	QMB1336	Reel Table Hub	M 19	QBT1920	Idler Spring	M 33	XSN2 + 16	Screw Ø2×16	M 49	XSN26 + 3	Screw Ø2.6×3	M 61	QXL1411	Lock Lever Assembly			
M 7	QML3655	Cam Follower	M 20	QBC1373	Reel Table Spring	M 34	XWG2	Washer	M 50	QXU0250	Reel Motor Assembly						
M 8	QML3680	Idler Select Lever				M 35	QXA1232	Brake Plunger Assembly	M 51	QBN1878	Holder Spring	M 62	QXF0190	Flywheel Assembly	M 71	QBT1566	Intermediate Lever S
M 9	QML3681	Erase Safety Lever	M 21	XTN2 + 6B	Tapping Screw	M 36	QML3865	Plunger Lever	M 52	QBP1946	Cassette Lock Spring	M 63	QMA4358	Center Angle	M 72	QXL1414	lock Lever-A
M 10	QMZ1283	Flywheel Thrust Retainer	M 22	XTN26 + 6BFZ	Tapping Screw	M 37	QBT1955	Plunger Spring				M 64	QMA4359	Side Angle-R	M 73	QXL1507	Lock Lever-B
			M 22	XTN26 + 6B	Tapping Screw	M 38	QXA1222	Side Angle Spring	M 53	QXL1406	Pressure Roller Lever	M 65	XTN3 + 6B	Tapping Screw	M 74	XUC25FT	Stop Ring
			M 23	XTN3 + 24B	Tapping Screw	M 38-1	QBT1755	Side Angle Spring	M 53-1	QBN1771	Pressure Roller Spring	M 65	XTN3 + 8B	Tapping Screw	M 75	QXR0780	Eject Rod Assembly
			M 24	XUB4FT	Stop Ring	M 39	QXA1076	Trigger Plunger Assembly	M 54	QMN2625	Eccentric Pin	M 66	XTN26 + 6BFZ	Tapping Screw	M 76	QKJ0499	Dumper Gear Holder
M 11	QDB0306	Capstan Belt	M 25, 26	XTN3 + 10B	Tapping Screw	M 40	QML3651	Trigger Plunger Lever	M 55	QXL1423	Idler Lever Assembly	M 68	XTN26 + 10B	Tapping Screw	M 77	QDG1254	Dumper Gear
M 12	QDB0287	Reel Motor Belt													M 78	XNG26	Nut
															M 79	XSN26 + 8B	Screw



o.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description	Ref No.	Part No.	Part Name & Description
	XTN26 + 8B	Tapping Screw	M 41	QML3653	Control Lever	M 56	QXI0116	Takeup Idler	M 69	QXH0390	Mechanism Cover	M 80	QMH2085	Cassette Holder
	QXD0120	Takeup Reel Table Assembly	M 42	QBT1278	Record Lock Lever Spring	M 57	QXL1408	Swing Gear Lever Assembly		"Silver Type"			QMH2085K	Cassette Holder
	QMK1867	Head Base Plate	M 45	QXU0280	Capstan Motor Assembly	M 58	QXL1409	Fast Wind Arm Assembly		QXH0390K	Mechanism Cover		"Black Type"	
	QNZ1252	Head Spacer	M 46	QXA1077	Motor Retainer Assembly	M 59	QML3659	Brake Lever	M 70	QBT1691	Lamp Lever Spring-B	M 81	XWG26	Washer
	QBC1103	Head Spring	M 47	QDB0286	Takeup Belt	M 60	QBG1132	Brake Rubber				M 82	QMA4072	Auto Tape Selector Angle
	XSN2 + 16	Screw $\varnothing 2.6 \times 16$	M 48	QXP0621	Takeup Pulley	M 61	QXL1411	Lock Lever Assembly				M 83	QML3716	Tape Detection Lever (for Normal/CrO ₂ Tape)
	XWG2	Washer	M 49	XSN26 + 3	Screw $\varnothing 2.6 \times 3$				M 71	QBT1566	Intermediate Lever Spring	M 84	QML3717	Tape Detection Lever (for Metal Tape)
	QXA1232	Brake Plunger Assembly	M 50	QXU0250	Reel Motor Assembly	M 62	QXF0190	Flywheel Assembly				M 85	QNM2642	Detection Lever Shaft
	QML3865	Plunger Lever	M 51	QBN1878	Holder Spring	M 63	QMA4358	Center Angle	M 72	QXL1414	Lock Lever-A	M 86	XTN2 + 5B	Tapping Screw
	QBT1955	Plunger Spring	M 52	QBP1946	Cassette Lock Spring	M 64	QMA4359	Side Angle-R	M 73	QXL1507	Lock Lever-B	M 87	XWG3	Washer
	QXA1222	Side Angle Spring	M 53			M 65	XTN3 + 6B	Tapping Screw	M 74	XUC25FT	Stop Ring	M 88	XWG26	Washer
	QBT1755	Side Angle Spring	M 53-1	QXL1406	Pressure Roller Lever	M 65	XTN3 + 8B	Tapping Screw	M 75	QXR0780	Eject Rod Assembly	M 89	XTN26 + 12B	Tapping Screw
	QXA1076	Trigger Plunger Assembly	M 54	QMN2625	Eccentric Pin	M 66	XTN26 + 6BFZ	Tapping Screw	M 76	QKJ0499	Dumper Gear Holder			
	QML3651	Trigger Plunger Lever	M 55	QXL1423	Idler Lever Assembly	M 68	XTN26 + 10B	Tapping Screw	M 77	QDG1254	Dumper Gear			
									M 78	XNG26	Nut			
									M 79	XSN26 + 8B	Screw			